# 200-BP-1 Groundwater Analysis Project, Parameters of Interest, Data Package Report No. 1

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Prepared for the U.S. Department of Energy Office of Environmental Restoration and Waste Management



Hanford Operations and Engineering Contractor for the U.S. Department of Energy under Contract DE-AC06-87RL10930



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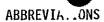
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## Attachment 1

Summary of Parameters of Interest Data by Well



not required and/or requested NR

The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).

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The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or IJ imprecise.

The data are unusable. R

SAMPLE IDENTIFICATION KEY	699 -     area   (699 = 600 Area)   (299 = 200 Area)	<u>52 - 57</u>   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank
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## WELL 699-52-57 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	SAMPLE				PARAMETER	OF INTEREST .			···
NUMBER	TYPE	Nitrite	Nitrato	Phosphate	Sulfate	Total Cyanide	Selenium	Blemuth	Free Cyanide
699-52-57-001	eoil	< 0.5 mg/Kg	2.9 mg/Kg (UJ)	< 3.0 mg/Kg	< 6.0 mg/Kg	0 (R)	< 0.5 mg/Kg (UJ)	< 10,0 mg/Kg	< 0.2 mg/Kg (UJ)
699-52-57-027	soil	< 0.5 mg/Kg	1.6 mg/Kg	< 3.0 mg/Kg	22.7 mg/Kg	0 (1)	< 0.6 mg/Kg (UJ)	< 10,0 mg/Kg	< 0.2 mg/Kg (UJ)
699-52-57-049 (aquipment blank)	water	< 5.0 µg/L	<i>جارهر</i> 5.0 >	< 31.0 μg/L	ا <i>يمر</i> 55.0 >	0.4 μg/L (J)	< 3.75 μg/L	< 7.25 μg/L	NR
699-52-57-050	lios	< 0.5 mg/Kg	1.2 mg/Kg	< 3.0 mg/Kg	19.7 mg/Kg	0.6 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	NR
699-52-57-050A (ambient field blank)	Water	< 5.0 µg/L	< 5.0 μg/L	< 31.0 μg/L	< 55.0 μg/L	0.9 µg/L (J)	< 3.75 μg/L	< 7.25 μg/L	NR
699-52-57-074 (aquipment blank)	water	< 5.0 μg/L (UJ)	(J) ا <sub>ل</sub> وبر 56.2	< 31.0 μg/L (UJ)	اروبر 55.0 >	0.1 μg/L (J)	< 3.75 μg/L	< 7.25 μα/L	NR
699-52-57-077	soil	< 0.5 mg/Kg	1.0 mg/kg	< 3.0 mg/Kg	15.0 mg/Kg	0.1 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	NR
699-52-57-077A (ambient field blank)	water	< 5.0 µg/L (UJ)	< 5.0 µg/L (UJ)	< 31.0 µg/L (UJ)	< 55.0 µg/L	0.1 µg/L (J)	< 3.75 μg/L	< 7.26 µq/L	NR
699-52-57-077-B (duplicate sample)	soil	< 0.5mg/Kg	0.9 mg/Kg	< 3.0 mg/Kg	13.3 mg/Kg	0.1 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	NR
699-52-57-101.5	sail	< 0.2 mg/Kg	0.4 mg/Kg	< 0.6 mg/Kg	5,4 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-52-57-125 (trip blank)	water	< 14.9 μg/L	< 14.9 µg/L	الم 60.0 <	< 250.0 µg/L	< 1.0 µg/L	< 3.75 μg/L	< 7.25 μg/L	NR
699-52-57-128	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	4.4 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-52-57-153	soil	< 0.2 mg/Kg	< 0.2 mg/Kg	< 0.6 mg/Kg	4.9 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR

## ABBREVIA .ONS

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- R The data are unusable.

SAMPLE IDENTIFICATION KEY	699 -   area (699 = 600 Area) (299 = 200 Area)	52 - 57       well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank	
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## WELL 699-55-55 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	SAMPLE				PARAMETER	OF INTEREST			
NUMBER	TYPE	Nitrite	Nitrate	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
699-55-55-001	#oll	< 0,5 mg/Kg	<0.5 mg/Kg	< 3.0 mg/Kg	< 6.0 mg/Kg	0.1 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	< 0.2 mg/Kg (UJ)
699-55-55-025	lios	< 0.5 mg/Kg	1.2 mg/Kg	< 3.0 mg/Kg	17.2 mg/Kg	o (1)	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	< 0.2 mg/Kg (UJ)
699-55-55-048 (equipment blank)	water	< 14.9 µg/L	< 14.9 μg/L	< 60.0 да/L	<i>الوبر</i> 250.0 >	1.5 µg/L (J)	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-050	soll	< 0.2 mg/Kg	0.4 mg/Kg	< 0.6 mg/Kg	8.2 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-050A (embient field blank)	Water	/پير 14.9 >	< 14.9 بيراً L	< 60.0 µg/L	< 250.0 بيا/L	< 1.0 µg/L (UJ)	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-073 (equipment blank)	water	(UJ) مر 14.9 ×	35.9 <u>µg/</u> L (U)	< 60.0 µg/L	ارمر 250.0 >	< 1.0 μg/L (UJ)	< 3.75 µg/L	L/وپر 7.25 >	NR
699-55-55-075	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	17.8 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-075A (embient field blank)	water	< 14.9 μg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 1.0 μg/L (UJ)	< 3.75 μg/L	< 7.25 µg/L	NR
699-55-55-098 (trip blank)	Water	< 14.9 µg/L	31.6 µg/L (U)	< 60.0 да/L	/لوپر 250.0 >	< 1.0 µg/L	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-56-101	lioa	< 0.2 mg/Kg	0.8 mg/Kg	< 0.6 mg/Kg	15.2 mg/Kg	0.1 mg/Kg (J)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-65-125	lica	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	21.3 mg/Kg	0.1 mg/Kg (U)	< 0.3 mg/Kg (U3)	< 0.1 mg/Kg (UJ)	NR
699-55-55-125A (duplicate sample)	soil	< 0.2 mg/Kg	O.5 mg/Kg	< 0.6 mg/Kg	16.1 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-150	soit	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	26.7 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR



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- R The data are unusable.

SAMPLE IDENTIFICATION KEY (69)	699 - 52   area well 9 = 600 Area) 9 = 200 Area)	- 57 - 049       number depth of s	
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## WELL 299-E33-38 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	SAMPLE	PARAMETER OF INTEREST							
NUMBER	TYPE	Nitrite	Nitrato	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
299-E33-36-006.2	soil	< 0.2 mg/Kg	0.6 mg/Kg	< 0.6 mg/Kg	6.3 mg/Kg	< 0.1 mg/Kg	< 1.3 µg/L (UJ)	(UJ) اوبر 4.3 >	NR



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	(299 = 200 Area)			

## WELL 299-E33-40 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	SAMPLE			·	PARAMETER	OF INTEREST			
NUMBER	TYPE	Nitrite	Nitrato	Phosphate	Sulfate	Total Cyanido	Selenium	Bismuth	Free Cyanide
299-E33-40-008	soli	< 0.2 mg/Kg	0.9 mg/Kg	< 0.6 mg/Kg	15.0 mg/Kg	< 0.1 mg/Kg (UJ)	< 1.3 µg/L (UJ)	(U3) اړ <i>ور</i> 4.3 >	NR
299-E33-40-200 (trip blank)	water	< 14.9 ب <i>وإ</i> ل	27.1 µg/L	الهر 60.0 >	< 250.0 μg/L	< 10.0 إور 10.0 >	< 5.0 µg/L	< 10.0 μg/L	NR
299-E33-40-201 (equipment blank)	water	/لوم 14.9 >	< 14.9 μg/L	الهر 60.0 >	< 250.0 μg/L	الهر 10.0 >	< 5,0 μg/L	< 10.0 µg/L	NR
299-E33-40-201A	water	< 14.9 μg/L	< 14.9 µg/L	اروبر 60.0 >	/L چې 250.0 >	< 10.0 µg/L	ا <sub>ل</sub> وم 5.0 <	< 10.0 μg/L	NR
299-E33-40-201.7	lioa	< 2.0 mg/Kg	8.2 mg/Kg	< 6.0 mg/Kg	98.4 mg/Kg	< 1.0 mg/Kg (UJ)	< 5.0 mg/Kg (R)	< 1.0 mg/Kg (UJ)	NR
299-E33-40-201.7A {duplicate sample}	sail	< 2.0 mg/Kg	7.8 mg/Kg	< 6.0 mg/Kg	76.3 mg/Kg (J)	< 1.0 mg/Kg	< 5.0 mg/Kg (R)	< 1.0 mg/Kg (UJ)	NR

## Attachment 2

Summary of Total Organic Carbon Data by Well

- NR not required and/or requested
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SAMPLE IDENTIFICATION KEY	699 -   area (699 = 600 Area) (299 = 200 Area)	52 - 57   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank
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#### **TOTAL ORGANIC CARBON SAMPLES - WELL 699-52-57**

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-52-57-157A	water (trip blank)	0.41 <i>μ</i> g/ml	10/23/90	10/26/90
699-52-57-157B	water (equipment blank)	0.99 <i>μ</i> g/ml	10/23/90	10/26/90
699-52-57-160A	water (ambient field blank)	0.65 µg/ml	10/23/90	10/26/90
699-52-57-160	soil	61.0 mg/Kg	10/23/90	10/26/90
699-52-57-160B	soil (duplicate sample)	84.1 mg/Kg	10/23/90	10/26/90
699-52-57-162.0	soil	47.9 mg/Kg	10/26/90	11/13/90

## ABBREVIA: 10NS

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  The data are unusable.
- R

SAMPLE IDENTIFICATION KEY    699	•	- <u>049</u>   depth of sample	A, B, C, etc.    duplicate, equipment blank, field blank, or trip blank
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## **TOTAL ORGANIC CARBON SAMPLES - WELL 699-50-53B**

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-50-53B-EB	soil	'94 μg/g (J)	04/25/90	05/01/90
699-50-53B-155.7	soil (duplicate sample)	43 µg/g (J)	04/25/90	05/01/90
699-50-53B-208	soil	22.6 mg/Kg (J)	10/10/90	04/27/90
699-50-53B-208A	soil (duplicate sample)	26.5 mg/Kg	10/10/90	04/30/90
699-50-53B-214	soil	14.1 mg/Kg	10/11/90	10/16/90
699-50-53B-225	soil	56.6 mg/Kg (R)	10/12/90	10/16/90

not required and/or requested NR

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The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or IJ imprecise.
The data are unusable.

R

SAMPLE IDENTIFICATION KEY	699 -   area (699 = 600 Area) (299 = 200 Area)	<u>52 - 57</u>   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank	The state of the s
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## **TOTAL ORGANIC CARBON SAMPLES - WELL 699-48-50**

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-48-50-168-1	soil	176 <i>μ</i> g/g	05/03/90	05/15/90
699-48-50-168-2	soil (duplicate sample)	131 <i>μ</i> g/g	05/03/90	05/15/90
699-48-50-176	soil	149 <i>μ</i> g/g	05/04/90	05/16/90
699-48-50-176.7	soil	221 <i>μ</i> g/g	05/04/90	05/16/90

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- IJJ imprecise.
  The data are unusable.
- R

(299 = 200 Area)
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## **TOTAL ORGANIC CARBON SAMPLES - WELL 699-49-57B**

SAMPLE NUMBER	SAMPLE MEDIUM	DIUM TOTAL ORGANIC DATE COLLECTED CARBON		DATE ANALYZED
699-49-57B-157.5	soil	173 μg/g (J)	04/24/90	04/27/90
699-49-57B-157.5D	soil (duplicate sample)	95 µg/g (J)	04/24/90	04/27/90
699-49-57B-160	soil	69 µg/g (J)	04/24/90	04/27/90
699-49-57B-161	soil	113 <i>μ</i> g/g	04/24/90	04/30/90
699-49-57B-216	soil	96.0 mg/Kg (J)	10/01/90	10/16/90
699-49-57B-216A	soil (duplicate sample)	52.2 mg/Kg (J)	10/01/90	10/16/90
699-49-57B-216B	water (field blank)	0.67 μg/mt (J)	10/01/90	10/24/90
699-49-57B-216C	water (trip blank)	0.40 μg/ml (J)	10/01/90	10/24/90
699-49-57B-216D	water (equipment blank)	0.16 μg/ml (J)	10/02/90	10/24/90
699-49-57B-220	soil	39.0 mg/Kg (J)	10/02/90	10/17/90
699-49-57B-229	soil	50.0 mg/Kg (J)	10/08/90	10/18/90
699-49-57B-229A	raw water	1.34 μg/ml (J)	10/08/90	10/25/90

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#### **TOTAL ORGANIC CARBON SAMPLES - WELL 699-52-54**

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-52-54-168.5	soil	280 μg/g	05/22/90	05/30/90

not required and/or requested NR

The material was analyzed for, but was not detected above the level of the associated value. The associated value U may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).

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UJ imprecise.

The data are unusable. R

SAMPLE IDENTIFICATION KEY	699 -   area (699 = 600 Area) (299 = 200 Area)	52 - 57   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank	
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## **TOTAL ORGANIC CARBON SAMPLES - WELL 699-55-55**

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-55-55-160	soil	92.3 mg/Kg	10/23/90	10/26/90
699-55-55-160A	soil (duplicate sample)	125 mg/Kg	10/23/90	10/26/90
699-55-55-162	soil	21.5 mg/Kg (J)	10/23/90	10/26/90
699-55-55-166	soil	61.5 mg/Kg	10/24/90	10/26/90
699-55-55-190	soil	23.8 mg/Kg	10/29/90	11/13/90

## Attachment 3

Summary of Parameters of Interest Data by Data Package

- NR not required and/or requested
- The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
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(699 = 600 Area) field blank, or trip blank (299 = 200 Area)
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## DATA PACKAGE #1 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE		PARAMETER OF INTEREST						
NUMBER	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (mg/kg)	Bismuth (mg/kg)	Free Cyanide (mg/kg)
Detectable Limit (DL)	0.5	0.5	3.0	6.0	0.1-0.4	0.5*	10.0*	0.2
699-52-57-001	< DL	2.9 (UJ)	< DL	< DL	0 (R)	< DL (UJ)	< DL	< 0.2 (UJ)
699-55-55-001	< DL	< DL	< DL	< DL	0.1	< DL (UJ)	< DL	< 0.2 (UJ)
699-52-57-027	< DL	1.6	< DL	22.7	0 (٦)	< DL (UJ)	< DL	< 0.2 (UJ)
699-55-55-025	< DL	1.2	< DL	17.2	0 (기)	< DL (UJ)	< DL	< 0.2 (UJ)
699-52-57-050	< DL	1.2	< DL	19.7	0.6	< DL (UJ)	< DL	NR
699-52-57-077	< DL	1.0	< DL	15.0	0.1	< DL (UJ)	< DL	NR
699-52-57-077-В <sup>**</sup>	< DL	0.9	< DL	13.3	0.1	< DL (UJ)	< DL	NR

Contract Required Detection Limit

Duplicate Sample

- not required and/or requested NR
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SAMPLE IDENTIFICATION KEY    SAMPLE IDENTIFICATION KEY   699   600 Area)   699   600 Area)   699   600 Area)   699   200 Area)   699   600 Area)
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## DATA PACKAGE #1 - PARAMETERS OF INTEREST- WATER SAMPLES

SAMPLE		PARAMETER OF INTEREST						
NUMBER	Nitrite	Nitrate	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
	(μg/L)	(μg/L)	(μg/L)	(μg/L)	(µg/L)	(μg/L)	(μg/L)	(μg/L)
Detectable Limit (DL)	5.0	5.0	31.0	55.0	1.0	3.75	7.25	
699-52-57-049 (Equipment Blank)	< DL	< DL	< DL	< DL	0.4 (J)	< DL	< DL	NR
699-52-57-050A (Ambient Field Blank)	< DL	< DL	< DL	< DL	0.9 (J)	< DL	< DL	NR
699-52-57-074 (Equipment Blank)	< DL (UJ)	56.2 (J)	< DL (UJ)	< DL	0.1 (J)	< DŁ	< DL	NR
699-52-57-077A (Ambient Field Blank)	< DL (UJ)	< DL (UJ)	< DL (UJ)	< DL	0.1 (J)	< DL	< DL	NR

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  The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or IJ imprecise.
- The data are unusable. R

SAMPLE IDENTIFICATION KEY	699 -   area (699 = 600 Area) (299 = 200 Area)	52 - 57   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank	
---------------------------	--	-----------------------------	--------------------------------------	---	--

#### DATA PACKAGE #2 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	PARAMETER OF INTEREST							
NUMBER	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (mg/kg)	Bismuth (mg/kg)	Free Cyanide (mg/kg)
Detectable Limit (DL)	0.2	0.2	0.6	3.8	0.1-0.4	0.3*	0.1*	N/A
699-55-55-050	< DL	0.4	< DL	8.2	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-55-55-075	< DL	0.5	< DL	17.8	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-52-57-101.5	< DL	0.4	< DL	5.4	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-55-55-101	< DL	8.0	< DL	15.2	0.1 (J)	< DL (UJ)	< DL (UJ)	NR
699-55-55-125	< DL	0.5	< DL	21.3	0.1 (U)	< DL (UJ)	< DL (UJ)	NR
699-55-55-125A <sup>**</sup>	< DL	0.5	< DL	16.1	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-52-57-128	< DL	0.5	< DL	4.4	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-52-57-153	< DL	< DL	< DL	4.9	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-55-55-150	< DL	0.5	< DL	26.7	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR

Instrument Detection Limit Duplicate Sample

- NR not required and/or requested
- The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J The associated value is an estimated quantity.
- UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R The data are unusable.

(299 = 200 Area)
------------------

#### DATA PACKAGE #2 - PARAMETERS OF INTEREST- WATER SAMPLES

SAMPLE	PARAMETER OF INTEREST								
NUMBER	Nitrite (µg/L)	Nitrate (µg/L)	Phosphate (µg/L)	Sulfate (µg/L)	Total Cyanide (µg/L)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (µg/L)	
Detectable Limit (DL)	14.9	14.9	60.0	250.0	1.0	3.75	7.25		
699-55-55-048 (Equipment Blank)	< DL	< DL	< DL	< DL	1.5 (J)	< DL	< DL	NR	
699-55-55-050A (Field Blank)	< DL	< DL	< DL	< DL	< DL (UJ)	< DL	< DL	NR	
699-55-55-073 (Equipment Blank)	< DL	35.9 (U)	< DL	< DL	< DL (UJ)	< DL	< DL	NR	
699-55-55-075A (Field Blank)	< DL	< DL	< DL	< DL	< DL (UJ)	< DL	< DL	NR	
699-55-55-098 (Trip Blank)	< DL	31.6 (U)	< DL	< DL	< DL	< DL	< DL	NR	
699-52-57-125 (Trip Blank)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	NR	

\*Contract Required Detection Limit

NR not required and/or requested

The material was analyzed for, but was not detected above the level of the associated value. The associated value U may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL). The associated value is an estimated quantity.

The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or IJ imprecise.

The data are unusable. R

SAMPLE IDENTIFICATION KEY	699 -   area (699 = 600 Area) (299 = 200 Area)	<u>52 - 57</u>   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank	
---------------------------	--	------------------------------------	--------------------------------------	--	--

## DATA PACKAGE #3 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	PARAMETER OF INTEREST									
NUMBER	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (mg/kg)		
Detectable Limit (DL)	0.2	0.2	0.6	3.7	0.1-0.4	1.3*	4.3*			
299-E33-38-006.2	< 0.2	0.6	< 0.6	6.3	< 0.1	< 1.3 (UJ)	< 4.3 (UJ)	NR		
299-E33-40-008	< 0.2	0.9	< 0.6	15.0	< 0.1 (UJ)	< 1.3 (UJ)	< 4.3 (UJ)	NR		

**Instrument Detection Limit** 

NR not required and/or requested

The material was analyzed for, but was not detected above the level of the associated value. The associated value U may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).

The associated value is an estimated quantity.

The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or J IJ imprecise.

The data are unusable. R

<u> </u>	699 -   area 699 = 600 Area) 299 = 200 Area)	52 - 57   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank
----------	--	-----------------------------	--------------------------------------	--

## DATA PACKAGE #4 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE	PARAMETER OF INTEREST								
NUMBER	Nitrite (mg/kg)	Nitrate Phosphate (mg/kg) (mg/kg)		Sulfate (mg/kg)	Cyanide		Bismuth (mg/kg)	Free Cyanide (mg/kg)	
Detectable Limit (DL)	2.0	2.0	6.0	34	1.0	0.5	10.0*		
299-E33-40-201.7	< 2.0	8.2	< 6.0	98.4	< 1.0 (UJ)	< 5.0 (R)	< 1.0 (UJ)	NR	
299-E33-40-201.7A **	< 2.0	<b>7.8</b> .	< 6.0	76.3 (J)	< 1.0	< 5.0 (R)	< 1.0 (UJ)	NR	

Contract Required Detection Limit

**Duplicate Sample** 



- NR not required and/or requested
- The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J The associated value is an estimated quantity.
- UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R The data are unusable.

SAMPLE IDENTIFICATION KEY	. 699 -   area (699 = 600 Area) (299 = 200 Area)	52 - 57   well number	- <u>049</u>   depth of sample	A, B, C, etc.   duplicate, equipment blank, field blank, or trip blank	
---------------------------	--	-----------------------------	--------------------------------------	---	--

## DATA PACKAGE #4 - PARAMETERS OF INTEREST- WATER SAMPLES

SAMPLE	PARAMETER OF INTEREST								
NUMBER	Nitrite (µg/L)	Nitrate (µg/L)	Phosphate (µg/L)	Sulfate (µg/L)	Total Cyanide (µg/L)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (µg/L)	
Detectable Limit (DL)	14.9	14.9	60.0	250.0	10.0*	5.0*	60.0*		
299-E33-40-200 (Trip Blank)	< 14.9	27.1	< 60	< 250	< 10	< 5	< 10	NR	
299-E33-40-201 (Equipment Blank)	< 14.9	< 14.9	< 60	< 250	< 10	< 5	< 10	NR	
299-E33-40-201A (Ambient Blank)	< 14.9	< 14.9	< 60	< 250	< 10	< 5	< 10	NR	

<sup>\*</sup>Contract Required Detection Limit

## Attachment 4

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 1

1123219352

00-BP-1 SUMMARY TABLE aboratory: PNL-325
DG #: Report 1, Rev 0

'ARAMETERS OF INTEREST - water sample value/qualifier

Parameter	DL (ppb)	52-57-049	52-57-050A	52-57-074	55-57-077A
WIONS (bbb)			·	<b></b>	
nitrite nitrate phosphate sulfate	5 5 31 55	<dl <dl <dl< td=""><td><dl <dl <dl< td=""><td><dl 56.2 <dl <dl< td=""><td>J <dl td="" uj<=""></dl></td></dl<></dl </dl </td></dl<></dl </dl </td></dl<></dl </dl 	<dl <dl <dl< td=""><td><dl 56.2 <dl <dl< td=""><td>J <dl td="" uj<=""></dl></td></dl<></dl </dl </td></dl<></dl </dl 	<dl 56.2 <dl <dl< td=""><td>J <dl td="" uj<=""></dl></td></dl<></dl </dl 	J <dl td="" uj<=""></dl>
N (ppb)					
total free	1	0.4 J NR	0.9 J NR	0.1 NR	J 0.1 J NR
GFAA (ppb)				•	
Se Bi	3.75 7.25	<dl< td=""><td><dl <dl< td=""><td><dl <dl< td=""><td><dl <dl< td=""></dl<></dl </td></dl<></dl </td></dl<></dl </td></dl<>	<dl <dl< td=""><td><dl <dl< td=""><td><dl <dl< td=""></dl<></dl </td></dl<></dl </td></dl<></dl 	<dl <dl< td=""><td><dl <dl< td=""></dl<></dl </td></dl<></dl 	<dl <dl< td=""></dl<></dl 

R not reported and/or requested

ll sample numbers begin with 699- prefix

0-8P-1 SUMMARY TABLE poratory: PNL-325 G #: Report 1, Rev 0

RAMETERS OF INTEREST - soil sample value/qualifier

Parameter	DL	52-57-001	55-55-001	52-57-027	55-55-025	55-57-050	52-57-077	52-57-077-8
-22222222	******	==========			********	===========	**********	*******
(IONS (ppm)								
		1					•	
nitrite	0.5	<b>⟨</b> 0L	<0L	<dl< td=""><td><b>&lt;</b>⊅L</td><td><dl< td=""><td>&lt;0L</td><td><dl< td=""></dl<></td></dl<></td></dl<>	<b>&lt;</b> ⊅L	<dl< td=""><td>&lt;0L</td><td><dl< td=""></dl<></td></dl<>	<0L	<dl< td=""></dl<>
nitrate	0.5	2.9 U	J <ol< td=""><td>1.6</td><td>1.2</td><td>1.2</td><td>1.0</td><td>0.9</td></ol<>	1.6	1.2	1.2	1.0	0.9
phosphate	3	<0L	٩L	<0L	<dl< td=""><td><b>√</b>0Ĺ</td><td>&lt;0L</td><td><dl< td=""></dl<></td></dl<>	<b>√</b> 0Ĺ	<0L	<dl< td=""></dl<>
sul fate	6	<0L	<b>&lt;</b> 0Ł	22.7	17.2	19.7	15	13.3
		l				•		
1 (ppa)								
• • • • • • • • • • • • • • • • • • • •		1						
total	0.1-0.4	0 8	0.1	0	1 . 01	0.6	0.1	0.1
free	0.2	<0.2 U	J <0.2 U	N <0.2	บง <0.2 ม	IJ NR	NR	NR
		ĺ			•			
.řAA (ppb)		İ						
		1						
Se	3.75	<dl td="" u<=""><td>J <dl td="" u<=""><td>IJ &lt;⊅L(</td><td>UJ <dłu< td=""><td>IJ <dl i<="" td=""><td>וו אור ו</td><td>าา &lt;อกาา</td></dl></td></dłu<></td></dl></td></dl>	J <dl td="" u<=""><td>IJ &lt;⊅L(</td><td>UJ <dłu< td=""><td>IJ <dl i<="" td=""><td>וו אור ו</td><td>าา &lt;อกาา</td></dl></td></dłu<></td></dl>	IJ <⊅L(	UJ <dłu< td=""><td>IJ <dl i<="" td=""><td>וו אור ו</td><td>าา &lt;อกาา</td></dl></td></dłu<>	IJ <dl i<="" td=""><td>וו אור ו</td><td>าา &lt;อกาา</td></dl>	וו אור ו	าา <อกาา
Bi	7.25	حاد	<0₺	<b>40</b> Ł	<dl< td=""><td><dl< td=""><td>٩L</td><td>≪OL</td></dl<></td></dl<>	<dl< td=""><td>٩L</td><td>≪OL</td></dl<>	٩L	≪OL
ĺ		l						

not reported and/or requested

I sample numbers begin with 699- prefix

## 200-BP-1 DATA QUALIFIER DEFINITIONS

- U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J The associated value is an estimated quantity.
- UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R The data are unusable.



## OSM RCRA LEVEL C DATA ASSESSMENT

DATE 12/5/90 SAMPI	.ES/MATRIX <u>699-52-57-001</u> <u>649-52</u> -51-050
REVIEWED BY OA Lerch	699-55-55-001 699-51-57-077
LABORATORY PNL	<u>619-52-57-027</u> <u>699-52-</u> 57-0718
CASE 1 PNL projed \$16772	<u>649-55-55-025</u> 6 <u>99-52-</u> 57-074
SDG # N/A	<u>699-52-57-050</u> <u>699-52-5</u> 7-077A 699-52-57-049
DATA ASSESS	MENT_SUMMARY
QUALITY_CONTROL_CHECK ANALYSIS	2 Solids Anion CN (total)
1. Holding Time	M/A X X
2. Blank Analysis	M/A X
3. MS/MSD	N/A N/A
4. Duplicate Analysis	<u> </u>
5. Matrix Spike	<u>N/A</u> 0
6. Glibrations/Control Stdc	<u>M/A</u> <u>O</u> <u>M</u>
7. Other QC	N/A See Attachment
8.	<del></del>
9.	
10.	
<pre>0 = data had no problems X = data qualified due to minor p M = data qualified due to major p</pre>	roblems roblems/some data may be unusable
overall assessment: <u>CN result un</u> recovery on 699-52-57-001; al	1 other results acceptable
w/qualification	
NOTES: <u>see "Other QC" for</u>	cross cef. sample #'s a
motrix	·
o Refer to the corresponding attachmen	ts for explanation of any problems



## OSM RCRA LEVEL C DATA ASSESSMENT

DATE 17/5/90 SAMPLES/MATRIX
REVIEWED BY JA Lerch 1
REVIEWED BY JA Lerch J.  LÄBORATORY PNC  CASE # PNC project #16772
CASE # PNC project #16772
SDG # N/A .
DATA ASSESSMENT SUMMARY
QUALITY CONTROL CHECK ANALYSIS GFAA CN (Free)
1. Holding time 0 0
2. Blank Analysis O O
3. MS/MSD O N/A
4. Duplicate Analysis O O
5. Metrix Spike X1 X
6. <u>Calibration Control</u> Std <u>O</u> <u>O</u>
7. Other QC see attachment
8.
9
10.
O = data had no problems X = data qualified due to minor problems M = data qualified due to major problems/some data may be unusable
OVERALL ASSESSMENT: <u>see page</u>
NOTES: analytical spikes
O Refer to the corresponding attachments for explanation of any applican

Cover Page. 20fZ

50 /WXI II40

## RCRA LEVEL C QC

		***************************************	-56.55 <u>-5-45</u>
Name	1 lerch	1 Dat	e <u>12/5/90</u>
QC Check:	Holding	times	
COMMENTS:	% solids.	- Holding within z	time N/A, all samples (soil) analyzed 3 days
Anions	- nitrate, samples	nitrite :	phosphate HT's exceeded for 17-074 and 694-692-699-52-57-077A
ALLEMA: C	N(total) - 1 water +	14 day hi	olding time exceeded on several les (see below)
ACTION:	Qualify ass	ociated res	ultr as per osm guidelines
<u>sample #</u> 99-52-57-074	constituent Nitrate Nitrite Phosphate	value/qual サナ リナ リナ	sample # constituent value/qual
699-52-57-077A	Nitrate Nitrite Phosphote	UJ UJ	
699-52-57-027 699-55-55-025 699-52-57-049 699-52-57-050A 699-52-57-077A	CN(total)	तिप्प प्रम्प	

\_\_\_ of /2\_

## RCRA LEVEL C QC

Name JA Lerch Date	12/5/90
Name JA Lerch Date  QC Check: Holding times (c	ont)
COMMENTS: GFAA - all elemen	ts analyzed within 6 mo HT yzod within Holding time
ACTION: none	
sample # constituent value/qual	sample # constituent value/qual

2 of MV

		KCRA	LEVEL C QC			
Name	A lerch	Date	12/5/	90		
	Blank A		<del></del>			
	7.501ids		Nitrate	13, 12/5/90		
		outam of planks from			- 699-52-5 her detec	
obs	served bel	ow listed	DL's - no	qualificat	ion based	on sa result
ACTION: c	quideline	scociated	results	· as per	<u>M</u>	
					·	
	constituent CN	value/qual acceptable 2.9 U	sample #	<u>constituent</u>	value/qual	
	Nitrate	2.9 U				j
		- H				

3 of 12

RCRA LEVEL C QC

Name <u>JA Lerch</u> Date 17/5/90
QC Check: Blank Analysis (cont)
COMMENTS: GFAA-all procedure & continuing cal. blanks  free of contamination  Free CN - free CN blank Free of contamination
FRECH = FIEC LA DEAK TIEC OF CONTAMINATION
ACTION: NONE
•
<pre>sample # constituent value/qual sample # constituent value/qual</pre>

<u>4</u> of 12

 $\bigcirc$ 

RCRA LEVEL C QC

Name JA Lerch Date 1965/90	
QC Check: MS/MSD	
comments: GFAA- MS, MSD recoveries and associated  RPS acceptable for Se, Bi analys	ا ا
ACTION: NONE	
sample # constituent value/qual sample # constituent value/qual	

5 of 12

## RCRA LEVEL C OC

Name JA Lerch of Date	12/5/90	
QC Check: Duplicate anal	<u> </u>	
comments: 7. solid - all dupli	cator RPD's ok	
Anions - Nitrate RPD 26% for RPD's ok or N/A	or 699-52-57-001;	all other
CN- all CN duplicate R	PD's ok	
ACTION: qualify associate osm quidelines	d results as pe	
sample # constituent value/qual   -57.001 Nitrate 2.9 UJ	sample # constituent	value/qual

<u>6</u> of <u>12</u>

## RCRA LEVEL C OC

Name JA Lerch Date	e <u>12/5/90</u>
Name <u>JA Lerch</u> Date  QC Check: <u>Duplicate analysi</u>	is (cont)
COMMENTS: GFAA - See MS/	
ACTION: none	•
sample # constituent value/qual	sample # constituent value/qual

7 of 12

RCRA LEVEL C QC

Name JA lerch Date	12/5/90
QC Check: Matrix Spike	<u>.</u>
comments: 20 solids - N/A  Anions - all spike 70R  CN-all recoveries with	within 75-125% no problems in 93-116% no problems
ACTION: <u>none</u>	
sample # constituent value/qual	sample # constituent value/qual

8 of 12

#### RCRA LEVEL C QC

	Name	A Lerch	JJ Dat	12/5/90	<u> </u>					
	QC Check: Matrix Spike (cont)									
	comments: GFAA (analytical spikes)-all Bismuth analytical									
		spike 70	R within li	uits, all s	e wate	r analyti	ical spikes			
		ok; Sev	eral Se s	ioil recover	yires ou	t of conte	rol (See below)			
	Free C	N - spik	~ recove	ery low	•		·			
เก				ted resul	ltr as	per				
<b>4</b>			quideline			7				
			,				•			
<u></u>					· <del>·</del> ·	<del></del>				
9-51	<u>sample #</u> -57-001	constituent Se	value/qual	sample # com	<u>nstituent</u>	value/qual				
679 - 55-5	55-001	Se	uJ			•				
<u> 79 - 52-5</u>	7-027	Se	てい							
<u> </u>	55-025	Se.	J.							
~ 699 -65 - 5	57-050	Se	LJ							
699-52-9	57-077	Sa	tu							
699-52-	57-071B	Se	UJ							

9 of 12

FreeCN

699-52-55-001 699-55-55-001

699-52-57-027 699-55-55-025

# RCRA LEVEL C OC

11 1 1

	Name JA Lorch 1 Date 12/5/90
	ac check: <u>Calibrations/Control Samples</u>
	COMMENTS: 7. Solids - N/A
	Anions_all verification std + LCS recoveries ok CN-calibration recoveries ok; LCS recovery very low (<47)
	for 699-52-57-001, all other LCS 70R ok
	ACTION: qualify associated results as per
	- Guicelines
(39-5	sample # constituent value/qual sample # constituent value/qual
	due to very low recovery

# RCRA LEVEL C QC

Name JA Lerch Date 12/5/90
QC Check: <u>Calibrations/Control Samples</u> (cont)
comments: GFAA - all initial + continuing cal. verification  7.R, control std recovery ok  Free CN - control std recoveries acceptable
ACTION:no ne_
sample # constituent value/qual sample # constituent value/qual

11 of 12

### RCRA LEVEL C QC

Name JA Lerch / Date 12/05/90
QC Check: Other
comments: Free CN run on only four samples (1st four listed on data assessment cover sheet)
Several results for CN reported less than
action limit with no flag
ACTION: qualify a CN results reported < D. as estimated (J)

99-52-5	<del></del>	constituent CN	value/qual O J
	55- <del>001</del> 7-027 55-025 7-049 51-050A 7-074		00 サブコン

WHC	PNL	matrix
699-52-57-001 699-52-55-001 699-52-57-007 699-55-55-025 699-55-57-050	90-5335 90-5336 90-5343 90-5344 90-5345 90-5351 90-5346 90-5347 90-5352 90-5353	Soil Soil Soil Soil Soil Soil Water Water Water

# 200-BP-1 GROUNDWATER ANALYSIS PROJECT

# PARAMETERS OF INTEREST DATA PACKAGE/REPORT No. 1 Revision 0

December 3, 1990



Prepared by: B.M. Gillespie

Pacific Northwest Laboratory

(PNL Project #16772)

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#### CONTRIBUTORS LIST

#### PROJECT MANAGEMENT OFFICE

BM Gillespie, Project Manager GK Gerke, Quality Engineer JL Daniel, Quality Control Coordinator TM Longaker MK Allen JA Gibson

#### INORGANIC\_ANALYSIS

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MW Urie, Task Leader JM Robbins SI Barsoum D Ortiz JH Ennen JA Creim

#### RADIOCHEMISTRY\_ANALYSIS

NL Wynhoff, Task Leader SK Fadeff NL Abbey GG Brodaczynski DL Fassler EA Lepel DW Koppenaal EJ Wyse

#### INTRODUCTION

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This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 17662 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, uranium activity, and tritium. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are include in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 15) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

#### CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

Washington Bellegie

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B. M. Gillespie

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200-BP-1 Project Manager

Date

#### Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

J. L. Daniel

PNL ACL Quality Representative

Date

<u>Table 1</u>: 200-BP-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number
699-52-57-001	90-5335
699-55-55-001	90-5336
699-52-57-027	90-5343
699-55-55-025	90-5344
699-52-57-050	90-5345
699-52-57-049	90-5346
699-52-57-050A	90-5347
699-52-57-077	90-5350
699-52-57-077B	90-5351
699-52-57-074	90-5352
699-52-57-077A	90-5353

# **INORGANIC DATA TABLES**

#### ANION ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. The sample solution was then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis was performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte.

The mean % spike recoveries and their standard deviations (SD) are as follows:

	SAM	PLE +	SPIKE	BLANK + SPIKE			
	SOILS (% REC)	SD (%)	WATI	R SD (%)	SOIL AN	D WATER SD (%)	
N02-N	94.7	7.1	116.7	5.4	95.0	16.4	
N03-N	100.5	2.6	104.0	2.2	98.9	1.8	
P04-P	90.0	7.0	99.2	2.0	92.3	4.9	
S04	99.1	3.7	103.3	2.8	100.5	0.5	

Upon review of the nitrate and sulfate soil analysis of duplicates a mean and standard deviation of the RPD's of the duplicate values are:

	<u> Mean (%)</u>	Std dev (%)
N03-N	7.8	10.8
S04	2.9	3.2

The values varied due to heterogeneity of sample matrix. The concentration of the other soil analytes and all analytes for water samples, was below the detection limits, therefore a relative percent difference is not calculated.

The hold times for water analysis of anions is 48 hours from sampling to the time of analysis. Hold times on water samples were met on two water samples and missed on the other two due to facilities maintenance. Since the hold times were only missed by 4.3 hours and 3.5 hours, there is no impact on the results. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

#### TABLE 3: ANICH IC ANALYSIS DATA

#### HITRITE

SOLIO SAMPLES

							_			********	Z RECOVERIE	S
		C1	C2		CS	correction of the correction o	•		_	c3	Cá	C4
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPO	BLANK	SPIKE SAMPLE	\$2(KE (mg/Kg)	BLAHK SPIKE	SPIKE	SAMPLE +	BLANK	LSC
SARPLE IN-	*******	/H3/73/	("3/79)	NFU	(ug)	(49/49)	(iig/kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SAMPLE
499-52-57-001	90-5335	ΦL	<0L	NA	ΦL	60.9	61.5	57.3	58.1	98.5	98.6	99.3
<b>4 34 3 33</b>	90-5335R	<0L	<dl< td=""><td>AK</td><td>≪IL</td><td>21.4</td><td>21.7</td><td>21.02</td><td>30.1</td><td>98.6</td><td>74.4</td><td>102.6</td></dl<>	AK	≪IL	21.4	21.7	21.02	30.1	98.6	74.4	102.6
										75.4		99.3
699-52-55-001	90-5336	<ol< td=""><td>≪UL</td><td>HA</td><td>&lt;0 L</td><td>75.1</td><td>80.5</td><td>72.9</td><td>71.6</td><td>80.5</td><td>71.6</td><td>98.0</td></ol<>	≪UL	HA	<0 L	75.1	80.5	72.9	71.6	80.5	71.6	98.0
	90-5336R	<0L	<0L	XA	ΦL	22.5	23.4			96.2		99.3
												97.4
699-52-57-027	90-5343	<dl< td=""><td><dl< td=""><td>NA.</td><td>&lt;0L</td><td>23.1</td><td>24.9</td><td></td><td></td><td>92.5</td><td></td><td>100.7</td></dl<></td></dl<>	<dl< td=""><td>NA.</td><td>&lt;0L</td><td>23.1</td><td>24.9</td><td></td><td></td><td>92.5</td><td></td><td>100.7</td></dl<>	NA.	<0L	23.1	24.9			92.5		100.7
re ee 03¢	00 5744			***								103.9
699-55-55-025	90-5344	<b>⊕L</b>	٩L	NA	۵۲	27.5	29.3			93.4		101.3
699-55-57-050	90-5345	<dł< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>95.0</td></dł<>										95.0
699-52-57-077	90-5350	<dl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>										
699-52-57-077-8	90-5351	<dl< td=""><td><dl< td=""><td>NA</td><td><dl< td=""><td>24.0</td><td>23.4</td><td>23.7</td><td>23.7</td><td>102.6</td><td>400.0</td><td>10. 7</td></dl<></td></dl<></td></dl<>	<dl< td=""><td>NA</td><td><dl< td=""><td>24.0</td><td>23.4</td><td>23.7</td><td>23.7</td><td>102.6</td><td>400.0</td><td>10. 7</td></dl<></td></dl<>	NA	<dl< td=""><td>24.0</td><td>23.4</td><td>23.7</td><td>23.7</td><td>102.6</td><td>400.0</td><td>10. 7</td></dl<>	24.0	23.4	23.7	23.7	102.6	400.0	10. 7
4// 12 11 01. 0	,, ,,,,,		-74	24	-02	24.0	۵.٠	۵.,	23.1	102.0	100.0	101.3
*OL * detection	limit of 0.5	ma/Ka (1	theoretical)						nean	94.7		-
									std. dev.	7.1		
										7.1		

WATER SAMPLES

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												X RECOVERIE	\$
		C1 Samp	F 63	CZ PPLE DUP		C5 BLANK	SPIKE SAMPLE		6: Now Colum	_	C3	C6	C4
SAMPLE ID#	PHL LOG#	(ug/		(ug/L)	RPO	(ug)	(ug/L)	(ug/L)	BLANK SPIKE	SPIKE (ug/L)	SAMPLE +	25 [KE Blynk	LSC SAHPLE
699-52-57-049	90-5346	<0	L	<ol< td=""><td>AK</td><td></td><td>***************************************</td><td>*******</td><td>*********</td><td></td><td>********</td><td>********</td><td>*******</td></ol<>	AK		***************************************	*******	*********		********	********	*******
699-52-57-050A	90-5347	<0	_	_ <0L	NA	<ol< td=""><td>0.0531</td><td>1520.0</td><td>1670.0</td><td>1520.0</td><td>110.5</td><td>109.9</td><td>102.6</td></ol<>	0.0531	1520.0	1670.0	1520.0	110.5	109.9	102.6
699-52-57-074		- •	בט ו	_	HA		1810.0	1520.0			119.1	****	
699-52-57-077A	90-5353 (	b) <0	LUQ	7 OL	AK		1830.0	1520.0			120.4		
*DL = detection	linie of S										*******		
De - detection	CIMIC OF 3	0976						•		mean std. dev.	116.7 5.4	95.0 16.4	100.3 2.1
										Stat Get.	7.7	10.4	4.1

Note: RPD only calculated when results are >DL.

- (a) Hold time missed by 4.3 hrs. (b) Hold time missed by 3.5 hrs.

#### TABLE 3: ANICH IC ANALYSIS DATA

NITRATE •••••

SOLID SAMPLES

SAMPLE ID#	PHL LOG#	SAMPLE SAMP	1/K3) CS CS	RPO	(13) 8[YHK 62	SPIKE SAMPLE (pX/pm)		(mg/Kg) Blank Spike	(mg/Kg)	C3 SAMPLE + SPIKE X REC.	c6 Blank Spike X rec.	C4 LSC Sample % rec.
699-52-57-001	90-5335 90-5335R	2.9 UJ 1.6	2.3 1.4	26.2 0	1.7 <0L	46.4 18.0	45.9 14.1	44.5	43.1	95.4 102.0	97.2	99.1 100.9 101.8
699-52-55-001	90-5336 90-5336R	<0L 0.4	ØL 0.5	NA 8.7	<0L <0L	60.2 17.9	59.8 17.3	53	53.1	100.7 100.8	99.8	100.0 100.9 102.7
699-52-57-027	90-5343	1.6	1.6	1.2	<0L	20.3	18.5			100.9		100.0
699-55-55-025	90-5344	1.2	1.2	1.6	<dl< td=""><td>23.8</td><td>21.7</td><td></td><td></td><td>104.0</td><td></td><td>100.9 101.8</td></dl<>	23.8	21.7			104.0		100.9 101.8
699-55-57-050 699-52-57-077	90-5345 90-5350	1.2 1.0										
699-52-57-077-8	90-5351	0.9	0.9	1.1	<dl< td=""><td>18.3</td><td>17.4</td><td>18.1</td><td>17.6</td><td>99.9</td><td>97.6</td><td>99.1</td></dl<>	18.3	17.4	18.1	17.6	99.9	97.6	99.1
*OL = detection	timit of U.2	Pg/Kg (theor	etical)						mean std. dev.	100.5 2.6		

WATER SAMPLES

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										*******	X RECOVERIE	s
SAMPLE ID#	PNL LOG#	C1 SAHPLE (ug/L)	C2 SAMPLE DUP (Ug/L)	RPO	65 3LAHK (Ug)	SPIKE SAMPLE (ug/L)	•	BLANK SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	SPIKE BLANK 64	C4 LSC SAMPLE
699-52-57-049 699-52-57-050A 699-52-57-074		<dl <dl (a) 56.2</dl </dl 		на на О	 ∢DL	1140.0 1230.0	1120.0 1130.0	1140.0	1130.0	101.8 103.9	100.9	100.0
699-52-57-077A *OL = detection	•	(b) <0L (	uj qi	NA		1200.0	1130.0		mean std. dev.	106.2 104.0 2.2	98.9 1.8	100.6 1.1

Note: RPO only calculated when results are >DL.

- (a) Hold time missed by 4.3 hrs.(b) Hold time missed by 3.5 hrs.

#### TABLE 3: AVICH IC ANALYSIS DATA

PHOSPHATE \*\*\*\*\*\*\*

SOLID SAMPLES \*\*\*\*\*\*\*\*\*\*\*\*

		-4				_	_			•	% RECOVERIE	\$
SAMPLE [0#	PHL LOG#	C1 SAMPLE (mg/Kg)	CZ SAMPLE DUP (mg/Kg)	RPO	CS 8LAHK (Ug)	(mg/Kg)	SP(KE (mg/Kg)	(mg/Kg)	SPIKE (ng/Kg)	C3 SAMPLE + SPIKE	C6 BLANK SPIKE	C4 LSC Sample
699-52-57-001	90-5335 90-5335R	4) 4)	<b>⊕</b> F	HA HA	<0L <0L	59.8 23.2	66.2 23.2	57	62.2	90.3 100.0	91.6	88.3 96.9 92.0
699-52-55-001	90-533 <b>6</b> 90-5336R	<b>◆</b> 0L 1.2	<b>Φ</b> ί	HA HA	<0L <0L	78.1 25.1	86.3 25.0	. 71.5	76.7	90.5 98.0	93.2	90.8 93.9 93.9
699-52-57-027	90-5343	۵L	<b>⊲</b> L	HA	<0L	23.0	26.7			86.1		95.1 92.6
699-55-55-025 699-55-57-050	90-5344 90-5345	<0L <0L	٩L	HA	<0L	25.6	31.4			81.5		93.9 93.9
699-52-57-077 699-52-57-077-8	90-5350 90-5351	<0L <0L	ΦL	HA	<0L	20.9	25.1	21.6	25.3	83.3	86.2	92.6
*OL = detection	timit of 3 s	ng/Kg (the	eoretical)						nean std. dev.	90.0 7.0		

WATER SAMPLES .....

		C1	C2	÷	cs	<u>-</u> -	<b></b>	••••••	<b>4</b>		X RECOVERIE	-
SAMPLE 10#	P4L LOG#	SAMPLE (J\g/L)	SAMPLE DU (Ug/L)	RPO	BLAXK (Pu)	SPIXE SAMPLE (Ug/L)		BLANK SPIKE (Ug/L)	SPIKE (ug/L)	SPIKE +	SPIKE Bryk Go	C4 LSC SAMPLE
699-52-57-049	90-5346	<dl< td=""><td><ol< td=""><td>AK</td><td></td><td></td><td>**********</td><td>***********</td><td>********</td><td>*******</td><td>•••••••</td><td>*******</td></ol<></td></dl<>	<ol< td=""><td>AK</td><td></td><td></td><td>**********</td><td>***********</td><td>********</td><td>*******</td><td>•••••••</td><td>*******</td></ol<>	AK			**********	***********	********	*******	•••••••	*******
699-52-57-050A	90-5347	٩L	<0L		<ol< td=""><td>1570.0</td><td>1620.0</td><td>1400.0</td><td>1630.0</td><td>96.9</td><td>98.2</td><td>98.2</td></ol<>	1570.0	1620.0	1400.0	1630.0	96.9	98.2	98.2
699-52-57-074	90-5352 (	(a) (0L	UJ OL	AH		1640.0	1630.0			100.6	,0.2	75.2
699-52-57-077A	90-5353 (	(b) <0L	uJ ot	AK		1630,0	1630.0			100.0		
										*******	*******	•••••
*DL = detection	limit of 31	ug/L							mean std. dev.	99.2 2.0	92.3 4.9	93.5 2.6

Note: RPB only calculated when results are >DL.

- (a) Hold time missed by 4.3 hrs.(b) Hold time missed by 3.5 hrs.

TABLE 3: ANION IC ANALYSIS DATA

SULFATE .....

SOLIO SAMPLES .....

										*******	% RECOVERIE	\$
		C1	CZ		C5	•	3	C	6	C3	C6	C4
		SAMPLE	SAMPLE DUP		BLANK	SPIKE SAMPLE	251KE	BLANK SPIKE	SPIKE	SAMPLE +	BLAHK	LSC
SAMPLE ID#	PNL LOG#	(mg/Kg)	(mg/Kg)	RPD	(ug)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SAHPLE
••••••	*******		•••••	******	•••••	*********	•••••	********	*******	******	••••	
699-52-57-001	90-5335	<0L	-OL	NA	<0€	203.0	203.0	191.0	191.0	100.0	100.0	98.8
	90-5335R	<dl< td=""><td>&lt;0L</td><td>HA</td><td><dl< td=""><td>72.9</td><td>71.3</td><td></td><td></td><td>102.2</td><td></td><td>99.5</td></dl<></td></dl<>	<0L	HA	<dl< td=""><td>72.9</td><td>71.3</td><td></td><td></td><td>102.2</td><td></td><td>99.5</td></dl<>	72.9	71.3			102.2		99.5
												99.8
699-52-55-001	90-5336	<dł< td=""><td>&lt;0L</td><td>AK</td><td>&lt;0L</td><td>265.0</td><td>265.0</td><td>236.0</td><td>235.0</td><td>100.0</td><td>100.4</td><td>99.2</td></dł<>	<0L	AK	<0L	265.0	265.0	236.0	235.0	100.0	100.4	99.2
	90-5336R	3.7	ø٤	NA	<dl< td=""><td>78.5</td><td>76.8</td><td></td><td></td><td>99.5</td><td></td><td>99.6</td></dl<>	78.5	76.8			99.5		99.6
												99.6
6 <del>99</del> -52-57-027	90-5343	22.7	21.3	6.4	<dl< td=""><td>97.5</td><td>81.9</td><td></td><td></td><td>92.2</td><td></td><td>98.8</td></dl<>	97.5	81.9			92.2		98.8
												99.2
699-55-55-025	90-5344	17.2	16.5	2.4	<dl< td=""><td>116.0</td><td>96.2</td><td></td><td></td><td>102.9</td><td></td><td>99.2</td></dl<>	116.0	96.2			102.9		99.2
												99.2
699-55-57-050	90-5345	19.7										
699-52-57-077	90-5350	15										
699-52-57-077- <b>8</b>	90-5351	13.3	13.3	0	-OL	87.5	76.9			96.5		101.6
										•••••		
*DL = detection	limit of 6 a	ng/Kg (th	egretical)						mean	99.1		
									std. dev.	3.7	•	

WATER SAMPLES \*\*\*\*\*\*\*\*\*

										•••••	% RECOVERIE	S
		ÇĪ	C2		CS		3	••0	6	C3	C6	C4
		SAMPLE	SAMPLE DUP		BLANK	SPIKE SAMPLE		BLANK SPIKE	SPIKE	SAMPLE +	BLAHK	LSC
SAMPLE 10#	PHŁ ŁOG#	(ug/L)	(ug/L)	RPO	(ug)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	SPIKE	SPIKE	SAMPLE
************	• • • • • • • • •	•••••	********			• • • • • • • • • • • • • • • • • • • •	******	•••••	•••••	•••••	*******	••••••
699-52-57-049	90-53-6	<0L	<dl< td=""><td>NA</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>	NA								
699-52-57-050A	90-5347	<dł< td=""><td>&lt;0L</td><td>HA</td><td><dl< td=""><td>4980.0</td><td>4980.0</td><td>5040.0</td><td>4990.0</td><td>100.0</td><td>101.0</td><td>100.0</td></dl<></td></dł<>	<0L	HA	<dl< td=""><td>4980.0</td><td>4980.0</td><td>5040.0</td><td>4990.0</td><td>100.0</td><td>101.0</td><td>100.0</td></dl<>	4980.0	4980.0	5040.0	4990.0	100.0	101.0	100.0
699-52-57-074	90-5352 (	a) <dl< td=""><td><dl< td=""><td>HA</td><td></td><td>5250.0</td><td>5000.0</td><td></td><td></td><td>105.0</td><td></td><td></td></dl<></td></dl<>	<dl< td=""><td>HA</td><td></td><td>5250.0</td><td>5000.0</td><td></td><td></td><td>105.0</td><td></td><td></td></dl<>	HA		5250.0	5000.0			105.0		
699-52-57-077A	90-5353 (	b) <0i	<dl< td=""><td>NA</td><td></td><td>5220.0</td><td>4980.0</td><td></td><td></td><td>104.8</td><td></td><td></td></dl<>	NA		5220.0	4980.0			104.8		
ent waterwetter							-			********	********	
*OL = detection	fimit of 33	しタノに							mean	103.3	100.5	99.4
									std. dev.	2.8	0.5	0.7

Note: RPD only calculated when results are >DL.

- (a) Hold time missed by 4.3 hrs. (b) Hold time missed by 3.5 hrs.

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#### CYANIDE ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-270, Total Cyanide in Waters, Solids or Sludges. The methodology is comparable to CLP SOW 788 Method 335.2 distillation and colorimetric technique for the analysis of cyanide. The analysis was performed in building 3720 in the 300 area.

The procedure, PNL-ALO-270, did not reflect the correct CLP standard preparation guidelines (Section 7.3.2.1 and 7.4.2.1). The analysts made a deviation to the procedure and used the client requested method, CLP SOW (788), Method 335.2, for the standard preparation (page D-76). An Interim Change Notice (ICN) or revision to the procedure will be written.

One set of samples was inadvertently spiked with a level above the CLP required spike level. The resulting % recovery was above 95%. During the analysis of the other samples, the KCN spike solution was found to be 80% of the specified CLP procedure requirements by titration with AgNO<sub>3</sub>. New KCN solution was prepared for subsequent batches.

The sample results were below the client required detection limits of 10  $\mu$ g/L and 1 mg/Kg. Sample results are all below 2 ppm therefore, free cyanide analysis was not required.

Upon review of the sample spiked data results, for soils results, the mean recovery is 103.3% with a standard deviation of 8% and for water results the mean recovery is 103.7% with a standard deviation of 2.2%. The spiked blank results mean recovery is 103.4% with a standard deviation of 9.7%. The overall spike recovery had a precision of  $\pm$  7% and a bias (accuracy) of  $\pm$  3.5% on the average.

The general Environmental Protection Agency (EPA) hold time for total cyanide is 12 days. In many cases the hold time was not met. The delay in work is attributed to the above mentioned method/procedure problems and internal logistics problems with Radiation Protection Technology (RPT). Attention was spent on analyzing the soil samples to meet (or come as close to) the hold times as they are more important and more critical to the investigation of the task. Note that the soils greatest "miss" on hold times is three days (Table 4, footnotes d and e). The water samples were field

blanks. When it was determined that hold times may not be met, priority was given to soil samples. There is no impact from the hold time not being met on the results of the soil sample analyses as they are below detection limits and the analysis was performed only 1 to 3 days late. There is no impact on the results of the late analysis dates of the water samples as they are below the detection limits as expected of field blanks.

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#### TABLE 4: TOTAL CYANIDE ANALYSIS DATA

### SOLID SAMPLES

												•••••	% RECOVERIE	Ş
			G1		GZ		GS	<u>G</u>	\$	(	6	63	Có	
			SARPLE	S	AMPLE DUP		BLANK	SPIKE SAMPLE	SPIKE	BLANK SPIKE	SPIKE	SAMPLE +	BLANK	LCS
SAMPLE ID#	PNL LOG#		(mg/Kg)		(mg/Kg)	RPO	(ug)	(mg/Kg)	(mg/Kg)	(rg/Kg)	(mg/Kg)	spike	SPIKE	SAMPLE
• • • • • • • • • • • • • • • • • • • •	*		********	~		•••••	******	*******	******	• • • • • • • • • • • • • • • • • • • •	•••••	******		• • • • • • • • • • • • • • • • • • • •
699-52-57-001	90-5335	(d)	ם ס	K	0.1		1.7 (4)	) 16.14	16.70 (b	) N/A	A/K	96.6	82.7	3.98 (c)
699-52-55-001	90-5336		0.1		0.1		0	15.29	15.66 (b	) N/A	H/A	97.6	100.2	110.8
699-52-57-027	90-5343	(e)	) 0	J	0.1		0	9.20	9.85	N/A	N/A	93.5	107.8	96.3
699-55-55-025	90-5344	(e)	9 8	J	0.1		٥	8.52	8.20	H/A	H/A	103.9	114.5	113.5
599-55-57-050	90-5345		0.6		0.2		0	9.39	8.07	H/A	N/A	116.4	106.7	116.1
699-52-57-077	90-5350		0.1		0.1		0.4	8.70	7.98	N/A	N/A	109.0	115.2	101.6
699-52-57-077-8	90-5351		0.1		0.1		0.6	8.93	8.40	8.5	8.4	106.3	106.7	91.1
												•••••	*******	
											mean.	103.3	104.5	
											std. dev.	8.0	11.0	

#### WATER SAMPLES

										*****	% RECOVERSE	\$
		<b>61</b>	G2		G5	<u>-</u>	3	(	6	c3	<b>C</b> 6	
		SAMPLE	SAMPLE DUP		SLAHK	SPIKE SAMPLE	SPIKE	BLAYK SPIKE	SPIKE	SAMPLE +	BLANK	LCS
SAMPLE ID#	PHL LCG#	(ug/L)	(ug/L)	RPO	(ug)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	SPIKE	SPIKE	SAMPLE
		*******		•••••	• • • • • • • • •		• • • • • • • • • • • • • • • • • • • •		••••••	******		******
599-52-57-049	90-5346 (	(f) 0.4	丁 0.8		0.2	41.15	39.82	41.84	39.82	103.4	105.1	108.3
199-52-57-050A	90-5347 (	9) 0.9	フ 0.3		0.7	41.47	39.82	40.61	39.52	104.2	102.0	104.7
599-52-57-074	90-5352 (	h) 0.1	J 0.2		1.9	40.19	39.82			100.9		97.2
679-52-57-077A	90-5353 (	i) 0.1	J -0.2		-0.3	42.24	39.82	37.12	39,82	106.1	93.2	100.9
										******		
									me&A	103.7	100.1	
Detection limits	for water	= 1 Ug/L							std. dev.	2.2	6.2	

Detection limits for water = 1 ug/L
Detection limit for soil = 0.1-0.4 mg/Kg (theoretical)

- (a) Blank was turbid due to exfoliation of precipitates from glass frit of adsorber.
- (b) Spike level higher than required due to miss calculation of spike level by anlayst.
- (c) LCS recovery low. Attributed to Analytical Error.
- (d) Hold time missed by 1 day.
- (e) Hold time missed by 3 days.
- (f) Hold time missed by 14 days.
- (g) Hold time missed by 13 days.
- (h) Hold time missed by 7 days.
- (i) Hold time missed by 8 days.

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#### GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestions were conducted in 125 mL narrow mouth bottles. Digestates were then analyzed by graphite furnace atomic absorption (GFAAS) following procedure PNL-ALO-215, Selenium (Atomic Absorption, Furnace Method), for selenium and PNL-ALO-216, Bismuth (Atomic Absorption, Furnace Technique), for bismuth. Se and Bi analysis methodologies are consistent with CLP SOW 788 Method 270.2. Digestion of samples was performed in building 325 and analysis by GFAAS was conducted in building 3720.

Analysis for Se and Bi was conducted on a Perkin-Elmer 5000, as a Zeeman equipped unit was not available. The quarterly instrument detection limit (IDL) for Se was found to be 1.5  $\mu$ g/L. The corresponding IDL for Bi was found to be 2.9  $\mu$ g/L.

A preliminary analysis of the samples was performed to determine the dilution factor necessary to bring the concentration to mid-range in the calibration curve. All samples were determined to have Se and Bi levels below the respective detection limits 3.75  $\mu$ g/L and 7.25  $\mu$ g/L. Detection limit was defined as 2.5 times the IDL.

Upon review of the data tables for selenium (Table 5A and 5B) and bismuth (Table 6A and 6B), the average recovery of selenium spike in waters is 98.2% with a standard deviation of 11.5%, the average recovery of selenium spike in soils is 65.3% with a standard deviation of 17.3%, the average recovery of bismuth spike in waters is 101.7% with a standard deviation of 6.1% and the average recovery of bismuth spike in soils is 90.5% with a standard deviation of 8.4%. A precision determined from the duplicate sample analysis is not possible since the results are below detection limits. Therefore, the precision and bias based on spike recovery information associated with this set of data are as follows:

#### Precision Bias (Accuracy)

Selenium in water	±12%	-2%
Selenium in soil	±17%	-35%
Bismuth in water	± 6%	+ 2%
Bismuth in soil	± 8%	- 9%

The large bias associated with the analysis of selenium in soil samples is attributed to the low concentrations of selenium and spike standard in the samples and matrix interference (of iron) in the samples. The matrix interference of iron interferes in the background determination in selenium analysis. A Zeeman background correction attachment (not available in this laboratory) is necessary for this matrix correction. The data in Tables 5A, 5B, 6A, and 6B are flagged with appropriate CLP (as defined in CLP SOW 7/88, pages B-19 and 20) flags where necessary. ICB, CCB, ICV, CRA, etc. are as defined in the CLP SOW 7/88, Section E.

The CLP SOW 788 specified hold time of 180 days was met as well as the contract required hold time of 120 days.

TABLE SA: SELENIUM ANALYSIS DATA

#### ACID EXTRACTABLE SELENIUM IN WATER SAMPLES

Lab (og #	Soin. Conc. (ug/L)	Results (ug/L)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike ZRec.	Standard %Rec.	CLP flags
1CB	0.5						
ICV (a)	26.0					98	
CCB	0.5						
CRA	5.1	•				102	
. CCB	-0.1						•
(90-5346-85	-0.1						
90-5346-85-AS	11.5			10	115		
90-5346-81	-0.4	<dl< td=""><td></td><td></td><td>• • • •</td><td></td><td>tt</td></dl<>			• • • •		tt
90-5346-81AS	10.0			10	100		•
90-5346-83	19.7	19.7		25	79		
90-5346-82	0.5	<0L	H/A		• • •		
90-5346-82-A\$	9.4			10	94		-
90-5346-84	21.9	21.9		25	,,	88	
90-5346-84-AS	33.5			10	116		
20-5346-86	21.8	21.8		25	87		
90-5347-81	0.3	<dl< td=""><td></td><td><del></del></td><td>-•</td><td></td><td>•</td></dl<>		<del></del>	-•		•
90-5347-B1-AS	10.6			10	103		_
CCA	25.5					97	,
CCB	0.0					•	
90-5352-81	-0.2	øL					บ
90-5352-81-AS	9.9			10	99		•
90-5353-81	0.1	<dl< td=""><td></td><td></td><td>,,</td><td></td><td>В</td></dl<>			,,		В
90-5353-B1-AS	10.0			10	100		
(d) 90-5357-81	0.1	<0L		,	100		8
(d) 90-5357-81-AS	10.2			10	. 102		0
(d) 90+5358-81	0.5	<dl< td=""><td></td><td>,,</td><td>102</td><td></td><td>8</td></dl<>		,,	102		8
(d) 90-5358-81-AS	9.0			10	85		•
CCA	25.7					97	
CCB	0.6					- •	

Notes:

(a) Used a dilution of ICF/ICV-2= 26.4 ug/L

(b) Analytical spike (AS) = 10 ug/L. (c)Pre-digest spike = 25 ug/L. for 83, 84 and 86. (d) Samples not part of Data Package #1 (e) RPO only calculated if both sample and duplicate are greater than detection limit.

B1 = SAMPLE

82 = SAMPLE DUPLICATE

B3 = SAMPLE + Se SPIKE B4 = LAB. CONTROL STANDARD

85 - PROCEDURAL BLANK

86 = SAMPLE + Se SPIKE DUPLICATE

Sample 1.0.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
699-52-57-049	90-5346	10/04/86	10/21/86	11/05/86
699-52-55-050A	90-5347	10/04/86	10/21/86	11/05/86
699-52-57-074	90-5352	10/09/86	10/21/86	11/05/86
699-55-57-077A	90-5353	10/09/86	10/21/86	11/05/86

CRDL\*: 5 ug/L DL (IDL x 2.5): 3.75 ug/L

<sup>\*</sup>CROL = Contract required detection limit

#### ACID EXTRACTABLE SELENIUM IN SOIL SAMPLES

Lab log #	Soln. Conc. (ug/L)	Results (mg/Kg)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike XRec.	Standard XRec.	CLP flags
1CB	0.2						*******
(CV (a)	25.6					97	
CCB	-0.1					• •	
CRA	4.8					96	
CCB	-0.1						•
90-5335-85	-0.1						•
90-5335-85-AS	9.5			10	95		
90-5335-B1	-3.6	<dl td="" €<=""><td>AJT</td><td></td><td></td><td></td><td>u,u</td></dl>	AJT				u,u
90-5335-B1-AS	5.3			10	53		•
90-5335-83	-1.3	Q.		25	0		
90-5335-83-AS	7.5			10	. 75		
90-5335-82	-2.4	<dl< td=""><td>H/A</td><td></td><td></td><td></td><td>U</td></dl<>	H/A				U
90-5335-82-AS	5.9			10	59		
90-5335-84 (d)	10.7	34.2				87	u
90-5335-R4-AS	18.1			10	74		
90-5335-86	-0.8	0		25	0		
90-5335-86-AS	7.8			10	78		
90-5335-87	23.8		_	25	95		
70-5336-81	•2.7	<dl (<="" td=""><td>uJ</td><td></td><td></td><td></td><td>น,บ</td></dl>	uJ				น,บ
90-5336-B1-AS	5.9		,	, 10	59		•
CCV	25.3					96	
CCB	0.5						
90-5343-81	-3.8	∢oL U	U"		,		v,u
90-5343-#1-AS	5.4			10	54		
90-5344-81	-4.3	∢ըլ Ն	iJ.				u,u
90-5344-81-AS	5.0			10	50		
" 90+5345-B1	-5.3	<b>∢</b> ∂L <b>Ł</b>	ヹ				พ.ช
90-5345-81-A\$	3.6			10	36		
90-5350-B1	3.3	∢ρL L	JJ				W,U
90-5350-81-AS	6.2			10	62		•
90-5351-81	-2.7	<01 €	J				u,u
90-5351-B1-AS	5,9			10	59		<b></b>
CCV	25.2					95	
CCB	0.3						

(a) Used a dilution of ICF/ICV-2= 26.4 ug/L

(b)Analytical spike (AS) = 10 ug/L.

(c)Pre-digest spike = 25 ug/L. for B3, 86 and B7.

(d) B4 = LCS-0287 containing 39.2 mg/Kg Se

B3 = SAMPLE + SE SPIKE

B4 = LAB. CONTROL STANDARD

B5 = PROCEDURAL BLANK

(e) RPD only calculated if both sample and duplicate are greater than detection limit. B1 = SAMPLE

BZ = SAMPLE DUPLICATE
B3 = SAMPLE + Se SPIKE

B6 = SAMPLE + Se SPIKE DUPLICATE B7 = SPIKED PROCEDURAL BLANK

Sample 1.D.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
************	********	*******	*******	***********
699-52-57-001	90-5335	09/25/86	11/11/86	11/13/86
699-52-55-001	90-5336	09/25/86	11/11/86	11/13/86
699-52-57-027	90-5343	10/01/86	11/11/86	11/13/86
699-55-55-025	90-5344	10/01/86	11/11/86	11/13/86
699-55-57-050	90-5345	10/04/86	11/11/86	11/13/86
699-52-57-077	90-5350	10/09/06	11/11/86	11/13/86
699-52-57-077-8	90-5351	10/09/86	11/11/86	11/13/86

0.5 mg/Kg DL (1DL x 2.5): 3.75 ug/L

<sup>\*</sup>CRDL = Contract required detection limit

TABLE 6A: BISHUTH ANALYSIS DATA ACID EXTRACTABLE BISHUTH IN WATER SAMPLES

	Solm. Conc.	Results	Duplicate	Spike (ug/L)	Spike	Standard	CLP
Lab log #	(ug/L)	(ug/L)	RPD (e)	(b,c)	XRec.	XRec.	flags
	***********	*******	********	*******	*******	******	
I CB	-0.6						
ICV (a)	33.5					98	
CCH	0.6						
CRA	9,8 +0.8					98	
CCB	*4.8						
90-5346-85	-0.1						
90-5346-85-AS	19.1			20	95		
90-5346-81	-0.2	<dl .<="" td=""><td></td><td></td><td></td><td></td><td>U</td></dl>					U
90-5346-81AS	19.9			20	99		
90-5346-83	48.3	48.3		50	97		
90-5346-82	1.7	<0L	H/A				
90-5346-82-AS	21.8			20	100		
90-5346-84	14.9	44.7		50		59	
90-5346-84 <b>-</b> A\$	36.5			20	108		
90-5346-86	40.3	48.3		50	97		•
90-5347-81	2.0	<dl< td=""><td></td><td></td><td></td><td></td><td></td></dl<>					
90-5347-81-AS	21.9			20	108		
CCV	36.7					110	
CCB	0.4					110	
90-5352-B1	•1.3	<dl< td=""><td></td><td></td><td></td><td></td><td>••</td></dl<>					••
90-5352-B1-AS	23.1	-UL		20	115		v
90-5353-81	•1.1	<0L		20	112		· . u
90-5353-81-AS	20.0	701		20	100		· U
(d) 90-5357-81	-0.5			20	100		U
(d) 90-5357-81-A				20	102		U
(d) 90-5358-81	-0.6			20	102		ti
(d) 90-5358-B1-A				20	98		•
CCA	32.6					98	
CCB	0.4						
Notes:							
(=) ICV & CCV =				B1 = SAMPLE			
(b) Analytical s	pike (AS) = 2	0 ug/L.		82 = SAMPLE D	UPLICATE		
(c) Pre-digest s			50 ug/L.	83 - SAMPLE 4	BI SPIKE		
(d) Samples not	part of Data	Package #1		B4 = LAB. COM		DARD	
(e) RPD only cal							
duplicate are gr	eater than de	tection lia	nit.	B6 = SAMPLE +	BI SPIKE	DUPLICATE	
		Sampi ion	Everantion				

<ul> <li>(c) Pre-digest spike for 83, 84 and 86 = 50 ug/t.</li> <li>(d) Samples not part of Data Package #1</li> <li>(e) RPD only calculated if both sample and duplicate are greater than detection limit.</li> </ul>	
Sampling Extraction	

Sample 1.D.	Lab. Log #	Sampting Date	Extraction Date	Analysis date
699-52-57-049	90-5346	10/04/86	10/21/86	11/04/86
699-52-55-050A	90-5347	10/04/86	10/21/86	11/04/86
699-52-57-074	90-5352	10/09/86	10/21/86	11/04/86
699-55-57-077A	90-5353	10/09/86	10/21/86	11/04/86

CROL\*: 60 ug/L DL (IDL x 2.5): 7.25 ug/L

<sup>\*</sup>CRDL = Contract required detection limit

TABLE 68: BISHUTH ANALYSIS DATA

#### ACID EXTRACTABLE BISHUTH IN SOIL SAMPLES

Lab log #	Soin, Conc. (ug/L)	Results (mg/Kg)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike XRec.	Standard XRec.	CLP flags
1CB	-0.1	_					
ICV (a)	24.5	•				98	
CCB	0.0					•-	
CRA	9.4		•			94	
CCB	-0.1					,	
90-5335-85	-0.3						
90-5335-85-AS	18.2			20	91		
90-5335-81	-0.6	<b>&lt;</b> 0L					U,N
90-5335-B1AS	18.0			20	90		•
90-5335-83	36.5	3.53		50	73		H
90-5335-82	. 0.1	<dl< td=""><td>N/A</td><td></td><td></td><td></td><td>-</td></dl<>	N/A				-
2A-5335-82-AS	18.9			20	94		
90-5335-84 (d)	17.5	32.5		i.		89	
90-5335-84-AS	35.6			20	89		
90-5335-86	37.2	3.44		50	74		N
90-5335-87	50.8			50	102		
90-5336-81	0,3	<0L					
90-5336-B1-AS	19.6			20	96		
CCA	26.0					106	
CCB	0.6				<b>F</b>	, ,,,,,,	
90-5343-81	-2.5	<dl< td=""><td></td><td></td><td></td><td></td><td>u.n</td></dl<>					u.n
90-5343-81-AS	19.3	•		20	96		4,
90-5344-81	-7.6	<0L		•••			U,N
90-5344-81-AS	18.3			20	91		•,
90-5345-81	-2.4	<0L			• • •		U,N
90-5345-81-AS	18.9		,	20	94		• • • • • • • • • • • • • • • • • • • •
90-5350-81	-1.4	<0L			• •		`บ,ห
90-5350-81-AS	19.5			20	97		
90-5351-81	-1.5	<dl< td=""><td>•</td><td></td><td></td><td></td><td>U.N</td></dl<>	•				U.N
90-5351-B1-AS	18.1			20	90		-,
CCV	26.8					107	
CCB	0.7						

**.** 1

(a) Used a dilution of ICV-2 = 26.4 ug/L
(b) Analytical spike (AS) = 20 ug/L.
(c) Pre-digest spike = 50 ug/L.
(d) 84 \* LCS-0287\* 40 ug Bi spike
(e) RPD only calculated if both sample & duplicate are greater than detection limit.

81 = SAMPLE

B2 = SAMPLE DUPLICATE
B3 = SAMPLE + B1 SPIKE
B4 = LAB. CONTROL STANDARD

85 = PROCEDURAL BLANK 86 = SAMPLE + 81 SPIKE DUPLICATE

B7 - SPIKED PROCEDURAL BLANK

Sample 1.D.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
•••••••		*****	•••••	*****
699-52-57-001	90-5335	09/25/86	11/11/86	11/13/86
699-52-55-001	90+5336	09/25/86	11/11/86	11/13/86
699-52-57-027	90-5343	10/01/86	11/11/06	11/13/86
699-55-55-025	90-5344	10/01/86	11/11/86	11/13/86
699-55-57-050	90-5345	10/04/86	11/11/86	11/13/86
699-52-57-077	90-5350	10/09/86	11/11/86	11/13/86
699-52-57-077-8	90-5351	10/09/86	11/11/86	11/13/86

10 mg/Kg DL (IDL x 2.5): 7.25 ug/L

<sup>\*</sup>CRDL = Contract required detection limit

TABLE 7: FREE CYANIDE ANALYSIS

Sample ID#	Sample mg/Kg	Sample Duplicate mg/Kg	Sample+ Spike mg/Kg	Spike Added mg/Kg	(20ppb) Control Std. ppb	Matrix Blank mg/Kg	Spike Duplicate mg/Kg	Spike Rec	Control Std. % Rec.
90-5335-J-1	<0.2 U	יבו		•					
90-5335-J-4					19.9				99.5
90-5335-J-4					15.9				79.5
90-5335-J-4	•				14.7				73.5
90-5335-J-4					18.3				91.5
90-5335-J-5	- •					<0.2	•		
90-5336-J-1	<0.2 U	J							
90-5336-J-3			0.44	1	•			44	
90-5336-J-6				1			<0.2		
90-5336-J-6				1			0.58	<b>*</b> 58	
90-5336 <b>-</b> J-6				1	•		0.745	**74.5	
90-5343 <i>-</i> J-1	<0.2 W	ヹ						•	
90-5343-J-2		<0.2							
90-5344 <b>-</b> J-1	<0.2 U	J							
							mean	58.8	86
							std. dev.	15.3	11.7

Note: Sample results reported based on undried sample weight.

- \* Freshly sonicated spiked sample spike sonicated 10/8/90.
- \*\* Stirred (magnetically) spiked sample not sonicated and hence no temperature rise during leaching.

Note: Based on control standard run before and immediately after this spiked sample, the spike recovery is within allowable limits. Detector response drift is obvious here in later portion of the analytical session.

J1 = SAMPLE

J2 = DUPLICATE SAMPLE

J3 = SPIKE SAMPLE

J4 = STANDARD

J5 = METHODS BLANK

J6 = SPIKE DUPLICATE

Jo 12/06/80

2

# 200-BP-1 GROUNDWATER ANALYSIS PROJECT

# PARAMETERS OF INTEREST DATA PACKAGE/REPORT No. 1 Revision 0

APPENDIX B
CHAIN OF CUSTODY



#### 200-BP-1 GROUNDWATER ANALYSIS PROJECT

# PARAMETERS OF INTEREST DATA PACKAGE/REPORT No. 1

#### Appendix B

#### TABLE OF CONTENTS

#### Appendix B - Chain of Custody

10

B1 - Westinghouse Chain of Custody and Sample Analysis Request Forms

B2 - PNL Chain of Custody Forms

B1 - WESTINGHOUSE CHAIN OF CUSTODY,
SAMPLE ANALYSIS REQUEST FORMS
AND PNL SAMPLE RECEIPT FORMS

Westinghouse Hanford Company	CHAIN O	FCUSTODY
Lompany Contact W.S. Thomoson	C, Telepho	one(SO9):373-3818
Lple Collected by W.S. Thompson	JU Robertsole 9/26/90	Time 0845 : 1008:
Sample Locations 69-52-57; 69	9-55-55	
ice Chest No. # SLEEPY POLYCO	OLER Field Logbook and Pa	ge No. WHC-N-287-2p.
Remarks SOIL SAMPLES COLLECTS		
FOR ANALYSIS OF PARAMET		21 RIJES) DOE/RL 88-32 Rev 1
Bill of Lading No	Offsite Property No.	·
Method of Shipment HAND CARRY		
1 <u> </u>	LAB. :	
Possible Sample Hazards <u>none</u> ide	entified with field enstru	uments - MAY BE
POTENTIAL UNKNOWN C	DNSTITUENTS.	<u> </u>
	. Sample Identification	
1) 699-51-57-001	. Jampie identineadon Li.	
a moer	oil, chemical analysis for	Domination of Tolomet
, , , , , , , , , , , , , , , , , , , ,	•	DTAL BETA; TRITIUM; Technemu
	rontium-90; Cesium-137; C	
	utonium - 239/240; TOTAL UK	
	NEHOONUCH DES! NITRATE : T	
	EZROCYANIOE FREE CHANIDE +	
2)699-55-55-001		
2,500 ml. amberglass. sui	il chemical analysis for	· Parameters of Interest
	AS ISTATED	ABOVE
		/
	/	
·	·	
7,	Chain of Possession	
Relinquished by: W.S. Thom pson		Date/Time:
A. S. Mormora	R3 1111	9/26/90 10/30 44.
Relinquished by:	Received by:	Date/Time:
83 Still		9/26/90 11:52ain
P rquished by	Received by:	Date/Time:
	•	
inquished by:	Received by:	Date/Time:
	•	

Sample Number and Type of Sample Type of Sample* Analysis Requested  SA-52-57-001; a, 500ml; amberglass; soil; chemical analysis for farameters of RADIO NUCLIDES: TOTAL ALPHA; TOTAL  TRITIUM: TECHNETIUM-99; STRONTIUM-99  CESTUM-137; COBALT-60; PLUTONIUM-2  PLUTONIUM-239/240; TOTAL URANIUM;  RUHIR NUM-106.  NON RADIONUCLIDES: NITERTE; TOTAL  CYANIOE: SULPHATE; SRENIUM: FERROCE  FREE CYANIOE: BISMUTH; Phosphate	rector W.S. Thompson; Jw Roberts R7 Steffbate Sampled 9/210/90 Timeas/5 hours inpany Contact (N.S. Thompson; Jw Roberts Telephone (509) 373-3818 1008  Sample Rumber and Type of Sample Containers  Type of Sample  LSZ-57-00/ ; 2, 500ml; amber class; soil; the mical analysis Requested  RADIO NUCLIDES: TOTAL ALPHA; TOTAL BETT TRITIUM: TECHNOR HUM-99; STRONTIUM-90;  CESSIUM-137; COMPACT-60; PULTONIUM-238; PLUTONIUM-339/240; TOTAL DE ANIUM; RUHIVENUUM-106.  NON RADIO NUCLIDES: NITHEATE; TOTAL  CYANIOE: SULPHATE; SQLEN UM; FERROCYAM  FREE CYANIOE: BISMUth: Thosphate  74-55-55:001 - 2, 500ml; amber class; Soil; Oil mical analysis for Rangular of Takes	) : (	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST
Sample Number and Type of Sample Type of Sample*  Analysis Requested  Analysis Request	Analysis Requested  Sample   Number and Type of Sample   Type of Sample   Analysis Requested    Social = 2, 500ml; amberdass; soil; chemical analysis for faramitar of therest    Radio Nuclibes: Total Alpha; Total Better    Taitium: Techne flow - 99; Strontium - 90;    Cesium - 137; Connett - 60; Plutonium - 238;    Plutonium - 106.   Non Radio Nuclibes: NITRATE; Total Cyanias: Sulphate; Selenium: Ferrocyani    Resident   S	(s		PART I: FIELD S	ECTION
Number Containers Type of sample Analysis for farmators and the mical analysis for farmators and farmators and farmators and farmators analysis for farmators and farmators and farmators analysis for farmators analysis for farmators and farmators analysis for farmators and farmators analysis for farmators a	Total and the containers of the mical analysis for Parameters of the rest Rapio Nucli Des: TOTAL ALPHA; TOTAL BETT TRITIUM; TECHNETIUM-99; STRONTIUM-90; CESIUM-137; COMPLT-60; PLUTONIUM-238; PLUTONIUM-239/240; TOTAL URANIUM; RUHIRRULM-106.  NON RADIONALIAES: NITERIE; TOTAL CYANIOE; SULPHATE; SEENIUM; FERROCYAMIEREE CYANIOE; BISMUth; Phosphate.  39-55-55-001 - 2,500ml; amber class; Soil; Cl. mical analysis for Riameters of Takes	collector V	U.S. Thompson; Junaan U.S. Thompson; J	Roberts RZ Tw Roberts	Steff Date Sampled 9/26/90 Time 08:45 hours Telephone (509) 373- 3818 1008
RADIO NUCLI DES: TOTAL ALPHA; TOTAL  TRITIUM: TECHNETIUM-99; STRONTIUM-90  CESIUM-137: COBALT-60: PLUTONIUM-2  PLUTONIUM-239/240; TOTAL URANIUM:  RUTHIERLUM-106.  NON RADIONUCLIAES: NITHEATE; TO:  CYANIOE: SULPHATE: SPENIUM: FERROCE  FREE CYANIOE: BISMUTH: Thosphate	RADIONUCLIDES: TOTAL ALPHA; TOTAL BETTER TRITIUM; TECHNOFIUM-99; STRONTIUM-90;  (PESIUM-137; (DBALT-60; PLUTONIUM-238;  PLUTONIUM-339/240; TOTAL JRANIUM;  RUHIRRULM-106.  NON RADIONUCLIDES: NITERIE; TOTAL  CYANIOE: SULPHATE: SRENIUM: FERROCYAM  FREE CYANIOE: BISMUTH; Thosphate.  24-55-55-001 -3 500ml; amber (1455; Soil; Oli mical Analysis for Rinmeter of Takes			Type of Sample*	Analysis Requested .
RADIO NUCLI DES: TOTAL ALPHA; TOTAL  TRITIUM: TECHNETIUM-99; STRONTIUM-90  CESIUM-137: COBALT-60: PLUTONIUM-2  PLUTONIUM-239/240; TOTAL JAANIUM:  RUTHER NUM, -106.  NON RADIONUCLIAES: NITHATE; TO:  CYANIOE: SULPHATE: SRENIUM: FERROC  FREE CYANIOE: BISMUTH: Thosphate	RADIONUCLIDES: TOTAL ALPHA; TOTAL BETT TRITIUM; TECHNOFIUM-99; STRONTIUM-90;  (PESIUM-137: (DOBALT-60; PLUTONIUM-238;  PLUTONIUM-339/240; TOTAL JRANIUM;  RUHIRRULM-106.  NON RADIONUCLIDES: NITERITE; TOTAL  CYANIOE: SULPHATE: SRENIUM; FERROCYAM  FREE CYANIOS; BISMUTH; Phosphate.  24-55-55-001 -3 500ml; amber (1455; Soil; Ol muca) Analysis for Rinmater of Interes  Takes	99-52-57-4	al +a, 500ml: ambero	hss: soil: che	mical analysis for farameters of interes
TRITIUM: TECHNETIUM-99: STRONTIUM-90  (ESIUM-137: COBALT-60: PLUTONIUM-2  PLUTONIUM-239/240: TOTAL URANIUM:  RUTHER NLLIM-106.  NON RADIONUCLINES: NITHATE: TOTAL  CYANIOE: SULPHATE: SREMIUM: FERROOF  FREE CYANIOE: BISMUTH: Thosphate	TRITIUM: TECHNETIUM-99; STRONTIUM-90;  (PESIUM-137: (DARLT-60: PUUTONIUM-238;  PLUTONIUM-339/240: TOTAL JAANIUM;  RUTHERIUM-10b.  NON RADIONUCLIAGS = NITHATE; TOTAL  CYAMIOE: SULPHATE: SAEMIUM: FERROCYAM  FREE CYANIOE: BISMUTH: Phosphate.  24-55-55-001 - 2,500ml; amberchass; Soil; Oil mucal alussis for Assamitar of Takre			'/	RADIO NUCLI DES: TOTAL ALPHA: TOTAL BE
PLUTONIUM-239/240: TOTAL URANIUM:  RUHIR NLUM-106.  NON RADIONUPLIAES: NITHATE; TO:  CYANIOE: SULPHATE: SEENIUM: FERROR  FREE CYANIOE: BISMUTH: Phosphate	CESSIUM-137: COMPACT-60: PLUTONIUM-238; PLUTONIUM-239/240; TOTAL URANIUM; RUHIRALUM-106.  NON RAPIDAUCLIAES: NITERTE; TOTAL  CYANIOE: SULPHATE; SEENIUM: FERROCYAN  FREE CYANIOE: BISMUTH: Thosphate.  24-55-55-001 -3,500ml; amber 4/455; Soil; al micol analysis for Asamstar of Takes				t e
PLUTONIUM-239/240; TOTAL JAANIUM; RUHIRRUUM-106.  NON RADIONUCLIAES: NITRATE; TOTAL  CYANIOE: SULPHATE: SEEMIUM; FERRU  FREE CYANIOE: BISMUTH; DAOSPHOTE	PLUTONIUM-239/240; TOTAL URANIUM; RUHIR NIUM-106.  NON RADIDWULLIDES: NITHATE; TOTAL  CYANIOE: SULPHATE; SREMUM; FERROCYAN  FREE CYANIOE: BISMUTH; Dhosphate  74-55-55-001; 2,500ml; amber (lass; Soil; al mical analysis for Alamaters of Takes				1 1 2
RUHIR NIUM - 106.  NON RADIONUCLIAES: NITHATE; TO:  CYANIOE: SULPHATE: SEEMIUM: FERROR  FREE CYANIOE: BISMUTH: Thosphate	Ruthenium - 106.  NON RADIONUCLIAES: NITERTE; TOTAL  CYAMOE: SULPHATE: SQUENIUM: FERROCYAN  FREE CYANIOE: BISMUTH: Diosphate.  24-55-55-001 -2,500ml; amber glass; Soil: Ol mical analysis for Asamutar of Taker	· · · · · · · · · · · · · · · · · · ·			
NON RADIONUCLIAES: NITHATE; TOO  CYANIOE: SULPHATE: SELENIUM; FERRUS  FREE CYANIOE: BISMUTH; Phosphote	NON RADIONUCLIAES: NITRATE; TOTAL  CYANIOE: SULPHATE: SEEMIUM: FERROCYAN  FREE CYANIOS: BISMUTH; Phosphate  74-55-55-001 - 3,500ml; amber (lass; soil; al mical analysis for Asamstar of Taken	,			1
CYANIOE: SULPHATE: SEENIUM: FERICO	CYANIOE: SULPHATE: SAENIUM: FERROCYAN  FREE CYANIOE: BISMUTH: Phosphate  79-55-55: 001 - 2,500ml; amber alass; soil; Oil mical analysis for Riamiter of Takes	•			_
FREE CYANIOS. BISMUTH: Thosphote	FREE CYANIOS; BISMUTH; Thosphote.  79-55-55-001 - 2,500ml; amber alass; Soil; Ol mical analysis for Parameters of Inter-				1
1094-55-55-001 - 2,500ml; amberglass; soil; Od mical analysis for Asameter of I		/			
3,500ml; amber glass; soll; ch mical analysis to tasamiter of		129-55-5	5'00/		
			2,500miamber	giass; sou; cu	mical analysis for thramiting of the
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		-100-7	quela unsurumento	accect NO	Mazardous constituent
Wei, field withsuments detect No hazar Down constituent	Clip field MALLEUMENT altect NO Mayor Down constituent				454
ile; field instruments detect No hazar Down constituent				<i></i>	ASC Sample van 4, 325 PNC
ipecial Handling and/or Storage hand carry in ASL sample van 4, 325 PNL	reial Handling and/or Storage hand carry in ASL sample van 4325 PNL	lab-	- Same day delin	cy_U_	
ile; field instruments detect No hazar Down constituent	reial Handling and/or Storage hand carry in ASL sample van 4325 PNL		· · · · · · · · · · · · · · · · · · ·	SOT W. L. CO.	
Special Handling and/or Storage hand carry in ASL sample van 4325 PNL Lab - Same day delwey	recial Handling and/or Storage hand carry in ASL sample van tr 325 PNL Lab Same day delivery			MAKT II: LABORAT	OKY SECTION
Special Handling and/or Storage hand carry in ASL sample van 4, 325 PNL	recial Handling and/or Storage hand carry in ASC sample van 4325 PNC Lab - Same day delivery  MART II: LABORATORY SECTION				

A-6000-406 (07/89)

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

#### SAMPLE RECEIPT FORM

()

1.

Deliv	ered by: R.Z. Steffler Date/Time: 9/26/90 11:52
Recei	ved by: MICHAEL W. URIE
Custo	mer Sample Number(s): 699-52-57-001, 699-55-55-001
ALO S	Sample Number(s): 90-5335 90-5336
ı.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list):  SAMPLE ANALYSIS REQUEST ACCOMPANIED COC.
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present_ Absent_ If Present, Condition: RED PLASTIC SEAL ON BOTHES GOOP
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
`.	Notes:
.5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  ICE IN COOLER - GOOLER IN GOOD COUDITION
6.	Condition of Sample Vials.  OKAY
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.  MA

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-004

Westinghouse Hanford Company		CHAIN OF CUSTODY	
Company Contact. W.S. Thor	mbson.	Telephone <u>· 373 - 38/8</u>	
	mpson/RIStelf	ate 19/2/90 Time 1/25	
Ice Chest No., SLEEPY	<del>-2/</del>	eld Logbook and Page No. <u>WHC-11-287-</u>	<del></del>
			$\sim 400T$
Remarks <u>Samples</u> a	alle cross green	MASP-1 NIFE	, Plyg.
Bill of Lading No	<u>A</u> 0	ffsite Property No	.
Method of Shipment <u>hand</u>	Carry +0325PNC	· slav ·	
Shipped to 325 PM/ You	· paramete	Dattrestandyns	
Possible Sample Hazards	Maicaled With	fuld instruments	
			<b></b>
1100 00 00	, . Sample Iden	tification	· • ·
1) 699-52-57-027	·// .		
, leter ofass, A	oil, chemical	anslepes of Parameters of At	erest!
		see Statement of arms	<u> </u>
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	Chain of Po	· · · · · · · · · · · · · · · · · · ·	
Relinquished by:	Received by:	RESTATION Date/Time:	
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Relinquished by:	Received by:		<del></del>
DO 1411		Date/Times	
R gaished by	77,700	10/2/10 /000 /12	·
ii Maisusa phil	Received by:	Date/Time:	
inquished by:	Pagained bus	2005	
** ·	Received by:	Date/Time:	• -
	1		F

	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST	
PART I: FIELD SECTION			
ollector _/s.	1.5. Thompson/R.Z.	Steffler	Date Sampled <u>/ O/o/90</u> Time/ <u>425</u> hours Telephone <u>(609 ) 373-38/8</u>
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
79-52-57	+027 1 liter class	soil Chen	see statement of work
	, , ,		Interest 0"
			De statement of work
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74		200-RP-	
1	hayanda indo	. //	
pecial Hand	iling and/or Storage	Ofrelled L	mustice.
		<del></del>	
		PARTII: LABORATO	DRY SECTION ,
~ceived by	W/h)Thi		1 1 1
		Title	1049 APARIN Date 10/2/90
lysis Red	lanca		

indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

### SAMPLE RECEIPT FORM

Deli	vered by: Steffler Date/Time: 10/2/40 1600
Rece	eived by: URIE
	omer Sample Number(s):
	Sample Number(s): 90-5343
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Sample Analysis Regist
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present_ ' Absent
	If Present, Condition: GOOD
4.	
•	Notes: N/A
. 5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  PHCKED IN TO 325 BLDG BY STEFFLER— COLLO NOT VERIFY SHIPPING CONTAINER, SAMPLE FELT COLD Condition of Sample Vials.
6.	Condition of Sample Vials.  Coop
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.  AGREE Mult
8.	Resolution of Problems or Discrepancies.
	N/A

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RETURN COMPLETED FORM TO PROJECT MANAGER

<u>w</u>	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST			
	PART I: FIELD SECTION				
Confector W.C	s. Thompson / RZ	Steffler on	Date Sampled <u>10/3/90</u> Time <u>0850</u> hours Telephone <u>15091373-36/18</u>		
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested		
699-55-55	5-025 2 Hiter	Pass soil	Berometers of Interest		
		/	Lar 200-80-P-		
			TOTAL ALPHA, TOTAL BETA, TRITIUM		
			TECHNETUM-99, Strontium-90, Cesium-		
		. /	COBAT-60 PUTONIUM -238 PLUTONIUM		
			239/240, TOTAL URANIUM, RUTHLINIUM		
		1	MITERTE, TUTAL CHANIDE, SIXFATE		
			SELENIUM, FERPOCHANIAS, FREE		
			CYANIDE, BISMUTH, PHOSHATE		
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		<u> </u>	1/		
Field Information	on Sanplas	Grand C	arried to 325 PNL LAB by ASL		
Domy	ling van. and	elepes of	er 200-BP-1 RI/PS. Sel		
-	ent of work	chilled	on wet ice		
		PARTII: LABORAT	ORY SECTION		
P~eived by		Title	noup leader Date 10/3/90		
lysis Requirاهــــ					

dicate whether sample is soil, sludge, water, etc.
ase back of page for additional information relative to sample location.

A-6000-406 (07/89)

Westinghouse Hanford Company		OF CUSTODY .
Company Contact W.S. Thompson		one <u>373-38/8</u>
Sample Collected by <u>W.S. Thoropto</u> Sample Locations <u>1699-55-55</u>		Time <u>0850 : </u>
Remarks Anny ples to be a	nalized idex :200 BD	
Bill of Ladik & No. ognif affice	Offsite Property & o.	NA MAJO
Method of Shipment hand of Shipped to 305 MVL LAS		y ASL sample van
Possible Sample Hazards <u>New Plana</u>	sicated by Gulder	istruments.
1699-55-55-025	. Sample Identification	-
2, 1-liter glassfairs,	Soil, Parameter, of	Interest - 200-89-1
	<del></del>	
	Chain of Possession .	
Relinquished by: W.S. THOMPSO, St. & Hompton	Received by:	Date/Time: 10/3/90 11:00
Relinquished by:	Received by:	Date/Time: 10/3/90 12:00 pm -
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:
	<u> </u>	<u>!</u>

## SAMPLE RECEIPT FORM

Deliv	ered by: 5teffler Date/Time: 10/3/90 12:01 pr
Recei	ved by: M. URIE
Custo	wer Sample Number(s): 699-55-55-025 (Bottles)
ALO S	Sample Number(s): 90-5344
1.	Customer Chain-of-Custody Form: Present Absent Absent
2.	Additional Shipping Forms (list): Sample Analysis Request
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
•	Notes: N/A
. <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). Steffler, Could NOT Verify Shipping Container. Samples Fell OLD Condition of Sample Vials.
6.	Condition of Sample Vials. Samples Fell OLD  GOOD
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents,
8.	Resolution of Problems or Discrepancies.
	NA

RETURN COMPLETED FORM TO PROJECT MANAGER

• Westinghouse Hanford Company	. CHAIN OF	CUSTODY			
Company Contact. Wondy Thompson . Telephone :373-3818					
s ple Collected by W.S. Thompson R.Z. Steff Bare 1015 190 Time 1030:0945:1045					
Sample Locations 699-62-57	Sample Locations 699-62-57, 600 AREA, North of 200 EAST (200-8P-1)				
Ice Chest No. " Slepes Cool	Field Logbook and Pag	10 NO. WHC-N-287-2-03235			
Remarks samples calletted					
of Interest Que statem		7			
Bill of Lading No. NA	Offsite Property No	NA			
Method of Shipment hand Carca	, same day day is	ASL Samplevan			
Shipped to 300 PNL 300		·			
Possible Sample Hazards None	ndicated by field in	struments			
Samples chilled or	· wetice	•			
	. Sample Identification				
169-52-57-050	· sample identification —	200-09-1			
2 1- liter glass Soil	28 system af [111] Ell	Interest (see statement of			
	TO ENGLISH TO STATE OF STATE O	woiE)			
699-62-57-049					
1. 500ml., glass, water a herical gratuits of anions etritum					
3, 1-liter, glass, water, MaOH, chemical analysis of CN and Tree CN					
- 1-liter glass natur HNOz, chemical analysis of metals, radiochemique					
1-liter, glass, natu, HNDz, chemical analysis of metals, Radiochemical					
1) 699-52-57-050A					
1,500ml, glass water chemical analysis of anions attituin					
3, 1- liter alone water, No OH Chemical analysis of CN and They CN					
3. 1- liter Espass, water HNOs chemical analysis or metals, radion homical					
aralipe					
Chain of Possession					
Relinquished by: W. S. Thompson		Date/Time:			
Francis & Shormon	8.7. St.111				
Relinguished by RZ Stelller	Received by A M. G: Heric	10/5/90 1200 hrs Date/Time: 14/5-190 13:17 hrs			
1.3 Styl	B.M. Dellami	145-190 13:17 hrs			
	Received by:	Date/Time:			
	•				
reinquished by:	Received by:	Date/Time:			
•	• ' i				

(	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST		
	PART II: FIELD SECTION			
	ompany Contact W. J. Thompson Telephone (809) 373-3818 1045			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested 200-8P-1 (see Statement of Justice	
699-52-57	1050: 2 Hitz, gar,	roil, Parami	ters of Interest Contract the Bouled	
699-52-57	749 1,500ml, slas	sunter, cr	mical analysis of anions + tritilim	
	3. 1-liter alo	12 urter 1	120H, Cremianalypio of CN + free CN	
·	3 1- litrige	rss, water,	VNOz chem. analypio of metals radioc	
699-52-57-	DSDA · 31-lite ge	us water No	OH, Crem analysis of CIVI Free CN	
	31-1tu 9	eas unter	HNO Orem. analysis of metals, analys	
سندام سندار سسيد وسسيد	1 500 ml 9801	water, C	nem. analype of anions + thitium	
			0	
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Field Informa	ation** Samples Och	Meted for	) 200-Bl-1 RIFS to be analyzingd	
year /			des chilled on wetice &	
Sam	e day deliver	1 40325 x	PNL LAB.	
Special Hand	lling and/bl Storage <u>1 30 C</u>	o Chilled	(See statement or work)	
·		0.070	20046567704	
<del></del>	0.1	PART II: LABORAT	OKA 2FC11ON	
	B.M. Dillipin	Title Pr	yint Many Date 10-5-90	
سخفاysis Req	uired	· · · · · · · · · · · · · · · · · · ·		
yere muli	**************************************	<del></del>		

dicate whether sample is soil, sludge, water, etc.
Use back of page for additional information relative to sample location.
B01-012

**C**,,

A-6000-406 (07/89)

## SAMPLE RECEIPT FORM

Del i	vered by: Stiffer Date/Time: 13'17
Rece	ived by: 61/18 pre
Cust	omer Sample Number(s): 699-52-57-050
	Sample Number(s): 90-5345
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Sample analyses Regulat
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: 6000
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.,
٠.	Notes: NA
.5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
c	Good; in in existence around simple willer. 5 mp for the
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.  Agreement
8.	Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

B01=013

## SAMPLE RECEIPT FORM

Del f	vered by: 5/eff/en Date/Time: 13:17 pm
Rece	ived by: Gillespur
Cust	ived by: 61/125pus omer Sample Number(s): 699-52-57-049 699-52-57-05A
ALO	Sample Number(s): 90-5345 90-5347
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Sample Analysis Regress
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.  1 500 ml glass Extended Anions/Tritium (NoThing)  Notes: 3 1.l metals/radehem (NaOH)  3 1.l CN/file (N (NaOH)
.5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.  Agree MWC
8.	Resolution of Problems or Discrepancies.
	N/A

T<sub>err</sub>

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford CHAIN OF CUSTODY		FCUSTODY			
ompany Contact. WELDY S. THOMISON Telephone (504) 373 - 3818					
mple Collected by: W. S. Thompson Date 10/10/90 Time 1015 1100, 1100 115					
Sample Locations - 1974-50" 1699-52-57 WELSITE IN GOODER, NORTH of 200 EAST					
Ice Chest No. #3 Coleman	Field Logbook and Pag	ge No. WHC-N-287-2-pg 42-44			
Remarks Samples Collected 4					
the 200-RP-1 RI/FS. (See	statement of work & ivorkplan	1 50E/PL 88-32)			
Bill of Lading No	Offsite Property No.				
Method of Shipment Wand Corry	<i>F</i> //	Le Your to 325 PNL Car-			
Shipped to 305 PNL LARGEATOR	y (300 ARM) :	•			
Possible Sample Hazards Yore Cilit	/ / / /				
Keys crelled on ice d	uring transportation to lab	<u>}-)                                    </u>			
	Sample Identification	_			
199-52-67-077					
2, 1-liter, glass, soil ( 1/2 File	AS REQUESTED Am DITTERANTE	Interest see 200-BAI Statement of			
	- Cycho /, Tartatella if	work			
<u>699-52-67-0778</u>					
2,1-liter, glass, soil ( & File	AS REQUESTED), PARAMETERS O	E INTEREST			
7-52-57-074	1-52-57-074				
1,500 ml, glass, water; chem	uicalomalipis of ANIDIUS &	TEITION			
3, 1 liter, grave; untri; one NAOH; analysis of CN & PETE CYANIOS					
3, Illiter, glass; mater and HNO3; analysis of metals & radio chemical analysis)					
24.55					
1)699-52-57-077A	<del></del>				
- in the second of the second	prical analysis of amor	Wetrituin 7 8			
	e NaOU; analipis of CNE				
3, situ, amberglan,	3, 1-liter, amber glass, water; 2ml His Osan alysis of metals & radio chemicals ) &				
	Chain of Possession				
Relinguished by: W. S. Thompson	Received by: R.2. Staffler	Date/Time:			
F. J. Shongen	R. S. Sterl	10/10/90 1155			
Relinquished by:	Received by	Date/Time:			
R.J. Still	111W/MW	10/10/90 1305HR			
telinquished by	Received by:	Dale/Time:			
quished by:	Pagained bus	0.000			
Administration of the second	equished by:  Received by:  Oate/Time:				
	B01=015	A-5000-407 (04/90)			

	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST	
PART I: FIELD SECTION			
Collector	U.S. Thompson R.s	2.54eff-ler 200-6	Date Sampled 10/10/90 Time 100 hours  Telephone (509 ) 373-38/5 1/15
Sample Number	Number and Type of Sample Containers	Type of Sample®	Analysis Requested
699-52-57	1-077 2-1 lite clear	glass Soil (1	fuel Parameters of Interest
	7-0718,2-1liter ce		ord (Kefull) Parameters of Interest
699-52-5	·   · · · · · · /	0	
	1,500 ml, clear glass	water an	as tititim; Parameters of Interest
	B. Lletter amber glas	Livete Inc	WaOH; analypes ON & FreeCN
	3 Mite amungla	in water Dr	PHNO 12 10/10/90 analysis ometals
1 699-52-5	7-0774:		
	1 500 ml clear glass, a	vatur anion	+ trituin; Parameters & literat
	7 1-liter amberges		NaOH. andysis of CN- Frea CN
	3 1-leter ambuggers.	Curatu 2mpt	(NO3: analysis of metals + radiochem-
	1	, , ,	
<u> </u>		<b>—</b>	
\			
<u> </u>	<del> </del>		
		<del></del>	
<b> </b>	<u> </u>	_	
		_	
Field Inform	ation all panole	drove we	tu) to be analyzed of farmetus
67 2	tuest Suggestin	200-BP-	I KI (FS 0
0	(	<u> </u>	
Special Hand	dling and/or Storage <u>Lee</u>	psemples	chilled Hand delivery
sam	e day to 325	PNL LAB	- 300 AREA () 3
		BARTH. LABOR.	Onverenou.
	MANTI	PARTII: LABORAT	OKY SECTION
?nceived by		Title	nous decale Date 10/10/ 40
-dysis Rec	quired		

Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

B01-016

SAMPLE RECEIPT FORM
Delivered by: Steller Date/Time: W/w/qo 13:05
Received by:
Customer Sample Number(s): 699-52-57-077-0778-074-077A
ALO Sample Number(s): 90 - 5350, 5351, 5352 5354 mg 10/11/90
1. Customer Chain-of-Custody Form: Present Absent
2. Additional Shipping Forms (list): Request for analysis
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.
Present Absent
If Present, Condition: 600 D.
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
· Notes: NA
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  ***LCED**
6. Condition of Sample Vials.
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.  Rescue Multiple Control of Control o
8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

### Attachment 5

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 2

200-BP-1 SUMMARY TABLE Laboratory: PNL-325 SDG #: Report 2; Rev 0

PARAMETERS OF INTEREST - soil sample value/qualifier

Parameter	Į DL	55-55-050	55-55-07\$	52-57-101.5	55-55-101	55-55-125	55-55-125A	52-57-128
		3322222222	2522222222				*********	=======================================
(mqq) 2MOINA								
	l	1						
nitrite	0.2	<b>                                     </b>	<0L	<0L	<0L	∢۵L	<0L	<dl< td=""></dl<>
nitrate	0.2	0.4	0.5	0.4	0.8	0.5	0.5	0.5
phosphate	0.6	<b>√</b> DL	<0L	<0L	<0L	∢DL	<0L	<dl< td=""></dl<>
sul fat <b>e</b>	3.8	8.2	17.8	5.4	15.2	21.3	16.1	4.4
CN (ppm)	 	! [						
	ĺ	ĺ				-	Ŧ	
total	0.1-0.4	่⊲วเบ	J <dl td="" u<=""><td>J <dll< td=""><td>J 0.1</td><td>UJ 0.1 L</td><td>J <dl td="" u<=""><td>ม <dl td="" มม<=""></dl></td></dl></td></dll<></td></dl>	J <dll< td=""><td>J 0.1</td><td>UJ 0.1 L</td><td>J <dl td="" u<=""><td>ม <dl td="" มม<=""></dl></td></dl></td></dll<>	J 0.1	UJ 0.1 L	J <dl td="" u<=""><td>ม <dl td="" มม<=""></dl></td></dl>	ม <dl td="" มม<=""></dl>
free	H/A	NR NR	NR	NR	NR	NR	1 NR	NR
GFAA (ppb)	ι 	} [						
	1	1						
Se	1.3	<idl td="" u<=""><td>u <idl td="" u<=""><td>J <fdl td="" u<=""><td>IJ <idl< td=""><td>UJ <idl t<="" td=""><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl></td></idl<></td></fdl></td></idl></td></idl>	u <idl td="" u<=""><td>J <fdl td="" u<=""><td>IJ <idl< td=""><td>UJ <idl t<="" td=""><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl></td></idl<></td></fdl></td></idl>	J <fdl td="" u<=""><td>IJ <idl< td=""><td>UJ <idl t<="" td=""><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl></td></idl<></td></fdl>	IJ <idl< td=""><td>UJ <idl t<="" td=""><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl></td></idl<>	UJ <idl t<="" td=""><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl>	JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl>	J <idl td="" uj<=""></idl>
Bi	4.3 	<10L U	J <[DL U	J <idl td="" u<=""><td>IJ <idl< td=""><td>UJ &lt;10L i</td><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl<></td></idl>	IJ <idl< td=""><td>UJ &lt;10L i</td><td>JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl></td></idl<>	UJ <10L i	JJ <idl td="" u<=""><td>J <idl td="" uj<=""></idl></td></idl>	J <idl td="" uj<=""></idl>
	•	•						

NR not reported and/or requested

all sample numbers begin with 699- prefix

200-BP-1 SUMMARY TABLE Laboratory: PNL-325 SDG #: Report 2; Rev 0

PARAMETERS OF INTEREST - water sample value/qualifier

Parameter	DL	55-55-048	55-55-050A	55-55-073	55-55-075A
ANIONS (ppb)	=======	, 22	======================================		
nitrite nitrate phosphate sulfate	14.9 14.9 60 250	<dl <dl <dl< td=""><td><dl <dl <dl< td=""><td><dl 35.9 U <dl <dl< td=""><td><dt <dt <dt< td=""></dt<></dt </dt </td></dl<></dl </dl </td></dl<></dl </dl </td></dl<></dl </dl 	<dl <dl <dl< td=""><td><dl 35.9 U <dl <dl< td=""><td><dt <dt <dt< td=""></dt<></dt </dt </td></dl<></dl </dl </td></dl<></dl </dl 	<dl 35.9 U <dl <dl< td=""><td><dt <dt <dt< td=""></dt<></dt </dt </td></dl<></dl </dl 	<dt <dt <dt< td=""></dt<></dt </dt 
CN (ppb) total free  GFAA (ppb)	1 N/A	1.5 J NR	<dl td="" u<=""><td>J <dl u<br="">NR</dl></td><td>IJ <dl uj<br="">NR</dl></td></dl>	J <dl u<br="">NR</dl>	IJ <dl uj<br="">NR</dl>
Se Bi	3.75 7.25	<dl <dl< td=""><td><dl <dl< td=""><td><dl <dl< td=""><td><dl <dl< td=""></dl<></dl </td></dl<></dl </td></dl<></dl </td></dl<></dl 	<dl <dl< td=""><td><dl <dl< td=""><td><dl <dl< td=""></dl<></dl </td></dl<></dl </td></dl<></dl 	<dl <dl< td=""><td><dl <dl< td=""></dl<></dl </td></dl<></dl 	<dl <dl< td=""></dl<></dl 

71121213115

NR not reported and/or requested

#### 200-BP-1 DATA QUALIFIER DEFINITIONS

- U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J The associated value is an estimated quantity.
- UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R The data are unusable.



### OSM RCRA LEVEL C DATA ASSESSMENT

DATE 1-	CAMPLEC MATRIX		
DATE 12/30/90	SAMPLES/MATRIX	<u>51-65-050</u>	55-55-101
REVIEWED BY JA Leach	1 begin w/699 prefix	55-55-048	<i>55-5</i> 5-698
LABORATORY PNL-325	premix	55-55-050A	55-55-125
CASE # <u>TPP 16772</u>		<u>55-55-075</u>	<u> 55 - 55 - 125</u>
SDG # Roport 2 Rev O - parameters of interest  DAT	FA ASSESSMENT SUMMA	55-55-073 55-55-075A 52-57-(01.5 RY	52-57-128 52-67-125 52-57-153 55-55-150
QUALITY CONTROL CHECK	ANALYSIS Anion:	E CN(total)	GFAA
1. Holding times			0
2. Matrix Spike	· <u> </u>	_0_	<u>×</u>
3. Duplicate Analysis		0	_ O_
4. Method Blanks	<u> </u>	X	0
5. Calibrations/Central Std	. <u>o</u>	0_	<u></u> 0 ;
6. Other	See a	tachment -	
7.		<del></del>	
8.			
9.			
10			
O = data had no problems  X = data qualified due to  M = data qualified due to	major problems/so	-	_
overall assessment: no m.			
NOTES: see other for 1	PNL-WHC SON	nple # correl	ation
+ sample metr	•	•	·
o Refer to the corresponding a	ttachments for exp	lanation of any p	roblems.

## RCRA LEVEL C QC

	<u> </u>			
Name JA Lerch	<u>J</u> Da	te <u>12/30</u>	190	•
QC Check: Holding	y time			
GFAA - all ho ACTION: qualify	ng time of water.  Iding time associate	riteria n samples e criteri d sample	ot met o	n several
as per	orm gu	delines		
Sample # constituent  699-55-55-075  699-55-55-075  699-52-57-101-5  699-52-57-125A  699-52-57-128  699-52-57-153  699-55-55-050  699-55-55-050A  699-55-55-073  699-55-55-075A	value/qual いたないないないないないないないないないないないないないないないないないないな	<u>sample</u> #	constituent	value/qual

0

1 of 6

## RCRA LEVEL C QC

Name JA Lerch Date	= <u>12/30/90</u>
QC Check: Matrix Spike	
comments: Anions - all recove	eries within 75 to 12670
	ecoveries within 92-108%
المران والمحسوما والمحسور	Had sike 20 low Se saike
Zor low (Soils) : Bish	auth spike ZoR low(soil) all water
ACTION: qualify associat	ed results as per lanok
osm quidelines	
,	·
sample # constituent value/qual  soil Sa, B: UJ	sample # constituent value/qual GFAA - low spike recoveries appear to be result of interferences and lack of Zeeman packground correction
:	
·	

RCRA LEVEL C QC Name JA Lerch Date <u>12/30/90</u> QC Check: <u>Duplicate Analysis</u> COMMENTS: Anions - all RPD's less than 10% or NA (in case of >DL) CN(total)-all RPD's acceptable (<7% or NA) GFAA- all duplicate results (MS/MSD) acceptable for both waters + soils ACTION: none sample # constituent value/qual sample # constituent value/qual

3 of 6

## RCRA LEVEL C OC

Name	TA Lerch	Dat	e <u>12/30</u>	190	
QC Check: Blank Analysis					
COMMENTS:	Anions-	nitrate co	interinational	ion detection	ed in several
GFAA-	race conta all bland qualify quidelin	cs frae o	f contai	nin ation	Soil blanks
55-073 55-018 55-101	nitrate	value/qual 35.9 U 31.6 U 0.1 UJ 0.1 U	sample #	<u>constituent</u>	<u>value/qual</u>

RCRA\_LEVEL\_C\_QC

Ci Ci

Name JA Lerch & Date 12/30/20
QC Check: Clibrations/Control Samples
COMMENTS: Anions-all calibrations, verification stds. BR o CN (total) - all initial cal. data ok, LCS recoveries ok GFAA- all calibration, control std BR ok
ACTION: NOVE
sample # constituent value/qual sample # constituent value/qual
5 of 6

## RCRA LEVEL C QC

Name	Alerch	<b>D</b>	ate 17/30/20
	: Other		
COMMENTS	: -free C	'N analy.	sis not run because
<del></del>	all tot	al CN re	isults were < 2ppm
••		la 10 al.	C
<del></del>	100	a selon	s for sample ID's smatrix
<del></del>			
ACTION:	none_		
			•
<u>sample #</u>	constituent	value/qual	sample # constituent value/qual
•			sample # constituent value/qual
	•		
MHC 1D .	PNL ID	matrix	
699-5 <del>5</del> 55-050	90-5356	Soil	
699-55-55-048	90-5357	water	
699-55-55-050A	90-5358	water	
699-55-55-075	90-6704	Seil	
699-55-55-073	90-6705	weder	
699-52-57-101.5	40-670G	Soil	
699-55-55-0754	90-6706	water	
699-55-55-101	90-6708	soil	
699-55-55-098	90-6769	water	
699-65-55-125	90-6710	Soi)	
699-55-55-125A	90-6711 90-6712	seil soil	
699-52-57-128	90-6713	५०। ( असंस	
699-52-57-125	90-6714	Soil	
699-52-57-153	90-47 <del>1</del> 7 90-6715	seil	
(- <sup>0</sup> 9 -55-5 <b>5</b> -150	70-0115		

<u>b</u> of <u>b</u>

### INTRODUCTION

متنع

C'

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPJP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPJP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, and tritium. Weight percent solid was also determined for soil samples. All data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 15) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

### CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B.M. Dellengeni

12-17-90

B. M. Gillespie

200-BP-1 Project Manager

Date

### Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

J' L Daniel

PNL ACL Quality Representative

Date

TABLE 1: 200-BP-1 Sample Numbers

WHC_Sample_Number	PNL ALO Sample Number	Sample Type
699-52-55-050	90-5356	Soil
699-55-55-048	90-5357	Water
699-55-55-050A	90-5358	Water
699-55-55-075	90-6704	Soil
699-55-55-073	90-6705	Water
699-55-55-075A	90-6706	Water
699-52-57-101.5	90-6707	Soil
699-55-55-101	90-6708	Soil
699-55-55-098	90-6709	Water
699-55-55-125	90-6710	Soil
699-55-55-125A	90-6711	Soil
699-52-57-128	90-6712	Soil
699-52-57-125	90-6713	Water
699-52-57 <b>-</b> 153	90-6714	Soil
699-55-55-150	90-6715	Soil

# **INORGANIC DATA TABLES**

TABLE 2:
WEIGHT PERCENT SOLIDS SUMMARY SHEET

SAMPLE ID#	PNL LOG#	SAMPLE WT %	DUPLICATE WT %	AVERAGE SOLIDS WT %
699-55-55-050	90-5356	96.67	96.03	96.35
699-55-55-075	90-6704	96.80	96.82	96.81
699-552-57-101.5	90-6707	96.70	96.48	96.59
699-55-55-101	90-6708	95.55	95.83	95.69
699-55-55-125	90-6710	96.42	96.48	96.45
699-55-55-125-A	90-6711	97.11	97.50	97.31
699-52-57-128	90-6712	97.20	97.38	97.29
699-52-57-153	90-6714	97.53	97.69	97.61
699-55-55-150	90-6715	96.05	96.11	96.08

<sup>\*</sup> Weight Percent Solids were determined following the method outlined in PNL-ALO-504.

### ANION ANALYSIS RESULTS

C'

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. The sample solution was then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis was performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte. Data results are reported as dry weight (i.e. converted from weight % solids).

The mean % spike recoveries and their standard deviations (SD) are as follows:

	SAMPLE + SPIKE			BLANK +	SPIKE	
	SOI REC ±	LS :_SD_(%)	WAT REC ±		SOIL AND REC ±	WATER SD (%)
NO2-N	100.3	1.4	109.4	9.5	107.4	9.4
N03-N	99.7	1.3	102.6	2.9	103.0	3.2
P04-P	84.0	2.7	92.7	6.2	96.3	4.4
S04	98.7	2.7	101.8	2.5	102.0	1.7

Upon review of the nitrate and sulfate soil analysis of duplicates a mean and standard deviation of the RPD's of the duplicate values are:

	<u> Mean(%)</u>	t Std dev(%)
N03-N	4.7	4.0
S04	6.0	2.5

-3

The values varied due to heterogeneity of sample matrix. Only one nitrate water analysis of duplicates was above detection limits and the RPD was 0. The concentration of the other soil analytes and all other analytes for water samples, was below the detection limits, therefore a relative percent difference is not calculated.

The hold times for water analysis of anions is 48 hours from sampling to the time of analysis. Hold times on water samples were met. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

TABLE 3: ANION IC ANALYSIS DATA

NITRITE (NO2-N)

#### SOLID SAMPLES -----

										% RECOVERIES		
		C1	C2		C5	·····C3	-		_	C3	C6	C4
		SAMPLE	SAMPLE DUP		BLANK	SPIKE+SAMPLE	SPIKE	DUP+SPIKE	SPIKE	SAMPLE +	DUP+	BLANK+
SAMPLE ID#	PNL LOG#	(mg/Kg)	(mg/Kg)	RPD	(na)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SPIKE
400 00 00 000 000		•••••		******		******						
699-52-57-077-B*		≪DL	ΦL	ЖĀ	<dl< td=""><td>24.0</td><td>23.4</td><td>23.7</td><td>23.7</td><td>102.6</td><td>100.0</td><td>101.3</td></dl<>	24.0	23.4	23.7	23.7	102.6	100.0	101.3
699-55-55-50	90-5356	<0L		NA								
699-55-55-075	90-6704	ΦĽ		HA								
699-52-57-101.5	90-6707	<₽L		AK								
699-55-55-101	90-6708	<ĐŁ	ΦL	NA		23.6	23.5			100.4		
699-55-55-125	90-6710	<dl< td=""><td></td><td>ЖA</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>		ЖA								
699-55-55-125A	90-6711	ΦL	⊲οL	NA	<dl< td=""><td>23.2</td><td>23.5</td><td>22.6</td><td>22.5</td><td>98.7</td><td>100.4</td><td>99.3</td></dl<>	23.2	23.5	22.6	22.5	98.7	100.4	99.3
699-52-57-128	90-6712	<dl< td=""><td></td><td>HA</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>•••</td></dl<>		HA								•••
699-52-57-153	90-6714	<dl< td=""><td>ΦL</td><td>NA</td><td></td><td>23.4</td><td>23.0</td><td></td><td></td><td>101.7</td><td></td><td></td></dl<>	ΦL	NA		23.4	23.0			101.7		
699-55-55-150	90-6715	ФL		HA								
						•				• • • • • • • • • • • • • • • • • • • •		
									mean	100.3	(C3 and C6)	)
DL = Detection l	imit of 0.2	mg/Kg							std. dev.	1.4		

WATER SAMPLES

											******	% RECOVERIE	5
)			C1	C2		C5	C	3		6	£3	C6	C4
			SAMPLE	SAMPLE DUP		BLANK	SPIKE+SAMPLE	SPIKE	DUP+SP1KE	SPIKE	SAMPLE +	DUP+	BLANK+
	SAMPLE ID#	PNL LOG#	(ug/L)	(ug/L)	RPD	(ug)	(Ug/L)	(ug/L)	(ug/L)	(ug/L)	SPIKE	SPIKE	SPIKE
	**********				•••••		•••••	•••••		*******		*******	
	699-55-55-048	90-5357	<dl< td=""><td>ΦL</td><td>NA</td><td></td><td>1780</td><td>1520</td><td></td><td></td><td>117.1</td><td></td><td></td></dl<>	ΦL	NA		1780	1520			117.1		
	699-55-55-050A	90-5358	<dl< td=""><td>&lt;0L</td><td>NA</td><td><dl< td=""><td>1670</td><td>1520</td><td>1800</td><td>1520</td><td>109.9</td><td>118.4</td><td>107.2</td></dl<></td></dl<>	<0L	NA	<dl< td=""><td>1670</td><td>1520</td><td>1800</td><td>1520</td><td>109.9</td><td>118.4</td><td>107.2</td></dl<>	1670	1520	1800	1520	109.9	118.4	107.2
	699-55-55-073	90-6705	≪DL	ΦL	HA	<dl< td=""><td>1630</td><td>1520</td><td>1750</td><td>1520</td><td>107.2</td><td>115.1</td><td>113.8</td></dl<>	1630	1520	1750	1520	107.2	115.1	113.8
	699-55-55-075A	90-6706	<dl< td=""><td>ΦL</td><td>NA</td><td></td><td>1900</td><td>1510</td><td></td><td></td><td>125.8</td><td></td><td>125.0</td></dl<>	ΦL	NA		1900	1510			125.8		125.0
	699-55-55-098	90-6709	ΦL	٩L	NA	<0L	1510	1530	1550	1520	98.7	102.0	100.7
	699-52-57-125	90-6713	<0L	ΦL	NA	∢DL	1520	1520	1510	1520	100.0	99.3	102.0
													******

109.4 (C3 and C6) 107.4 \*\*

9.5

mean

std. dev.

DL = Detection Limit of 14.9 ug/L

Note: RPD only calculated when both sample and duplicate results are >DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for OC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

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TABLE 3: ANION IC ANALYSIS DATA

NITRATE (NO3-N)

SOLID SAMPLES

										• • • • • • • • • • • • • • • • • • • •	X RECOVERIE	S
		C1	C2		C5	C	3	(	6	C3	C6	C4
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPD	(ng) Brank	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE	SAMPLE + SPIKE	DUP+ SPIKE	BLANK+ SPIKE
699-52-57-077-B*	90-5351	0.9	0.9	1.1	<dl< td=""><td>18.3</td><td>17.4</td><td>18.1</td><td>17.6</td><td>99.9</td><td>97.6</td><td>99.1</td></dl<>	18.3	17.4	18.1	17.6	99.9	97.6	99.1
699-55-55-50	90-5356	0.4		HA	-02	10.3	. 177	10.1	17.0	77.7	,,,,	,,,,,
699-55-55-075	90-6704	0.5		NA		_						
699-52-57-101.5	90-6707	0.4		••••		-						
699-55-55-101	90-6708	0.8	0.7	9.0		18.3	17.4			100.7		
699-55-55-125	90-6710	0.5				, <b>-</b>						
699-55-55-125A	90-6711	0.5	0.5	4.2	<dl< td=""><td>17.7</td><td>17.4</td><td>17.2</td><td>16.7</td><td>99.0</td><td>100.1</td><td>100.0</td></dl<>	17.7	17.4	17.2	16.7	99.0	100.1	100.0
699-52-57-128	90-6712	0.5				••••	••••		,,,,		•	
699-52-57-153	90-6714	<dl< td=""><td>0.4</td><td>NA</td><td></td><td>17.5</td><td>17.1</td><td></td><td></td><td>101.1</td><td></td><td></td></dl<>	0.4	NA		17.5	17.1			101.1		
699-55-55-150	90-6715	0.5										
DL = detection l	imit of 0.2	mg/Kg							mean	99.7		
									std. dev.	1.3		

WATER SAMPLES

										•••••	% RECOVERIES		
		C1	C2		C5	······C	5	(	6	C3	C6	C4	
SAMPLE ID#	PWL LOG#	SAMPLE (ug/L)		RPD	BLANK (ug)	SPIKE+SAMPLE (ug/L)	SPIKE (Ug/L)	DUP+SPIKE (Ug/L)	SPIKE (Ug/L)	SAMPLE +	DUP+ SPIKE	BLANK+ SPIKE	
699-55-55-048	90-5357	<dl< td=""><td>⊲υL</td><td>NA</td><td></td><td>1200</td><td>1130</td><td>***************************************</td><td></td><td>106.3</td><td></td><td></td></dl<>	⊲υL	NA		1200	1130	***************************************		106.3			
699-55-55-050A	90-5358	<dl< td=""><td>35.0</td><td>HA</td><td>35.2</td><td>1210</td><td>1130</td><td>1200</td><td>1130</td><td>105.5</td><td>104.6</td><td>108.0</td></dl<>	35.0	HA	35.2	1210	1130	1200	1130	105.5	104.6	108.0	
699-55-55-073	90-6705	35.9 U		0.0	<dl< td=""><td>1140</td><td>1130</td><td>1180</td><td>1130</td><td>97.7</td><td>101.2</td><td>104.4</td></dl<>	1140	1130	1180	1130	97.7	101.2	104.4	
699-55-55-075A	90-6706	<dl< td=""><td><dl< td=""><td>NA</td><td></td><td>1190</td><td>1120</td><td>*****</td><td>**</td><td>106.3</td><td></td><td>105.3</td></dl<></td></dl<>	<dl< td=""><td>NA</td><td></td><td>1190</td><td>1120</td><td>*****</td><td>**</td><td>106.3</td><td></td><td>105.3</td></dl<>	NA		1190	1120	*****	**	106.3		105.3	
699-55-55-098	90-6709	31.6 U	, <∂L	NA	31.6	1160	1130	1140	1130	101.3	99.5	103.6	
699-52-57-125	90-6713	<dl< td=""><td>35.5</td><td>NA</td><td>85.6</td><td>1170</td><td>1130</td><td>1170</td><td>1130</td><td>102.0</td><td>102.0</td><td>100.9</td></dl<>	35.5	NA	85.6	1170	1130	1170	1130	102.0	102.0	100.9	
DL = detection l	init of 14.	.9 ug/L				•			mean std. dev.	102.6	(C3 and C6)	103.0 **	

Note: RPD only calculated when both sample and duplicate results are >DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

/12/30/90

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## PHOSPHATE (PO4-P)

SOLID SAMPLES

		<b>E1</b>	c2		C5	C	3	(	:6	c3	X RECOVERIES	C4
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPD	BLANK (ug)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	SAMPLE + SPIKE	DUP+	BLANK+ SPIKE
699-52-57-077-B	90-5351	<0L	ФL	NA	ΦL	20.9	25.1	21.8	25.3	83.3	86.2	92.6
699-55-55-50	90-5356	ΦL						2.00			~	72.0
699-55-55-075	90-6704	ΦL										
699-52-57-101.5	90-6707	<dl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>										
699-55-55-101	90-6708	≪DL	<0L	NA		21.0	25.2			83.3		
699-55-55-125	90-6710	ΦL										
699-55-55-125A	90-6711	<dl< td=""><td><dl< td=""><td>NA</td><td><dl< td=""><td>20.5</td><td>25.2</td><td>19.7</td><td>24.1</td><td>81.3</td><td>81.7</td><td>90.8</td></dl<></td></dl<></td></dl<>	<dl< td=""><td>NA</td><td><dl< td=""><td>20.5</td><td>25.2</td><td>19.7</td><td>24.1</td><td>81.3</td><td>81.7</td><td>90.8</td></dl<></td></dl<>	NA	<dl< td=""><td>20.5</td><td>25.2</td><td>19.7</td><td>24.1</td><td>81.3</td><td>81.7</td><td>90.8</td></dl<>	20.5	25.2	19.7	24.1	81.3	81.7	90.8
699-52-57-128	90-6712	<dl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>										
699-52-57-153	90-6714	<dl< td=""><td><dl< td=""><td>HA</td><td></td><td>21.7</td><td>24.6</td><td></td><td></td><td>88.2</td><td></td><td></td></dl<></td></dl<>	<dl< td=""><td>HA</td><td></td><td>21.7</td><td>24.6</td><td></td><td></td><td>88.2</td><td></td><td></td></dl<>	HA		21.7	24.6			88.2		
699-55-55-150	90-6715	<dl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>										
			•							******		
DL ≈ detection l	imit of 0.6	mg/Kg							mean std. dev.	84.0 2.7	(C3 and C6)	)

WATER SAMPLES

						_	_				% RECOVERIES	
		C1 Sample	C2 SAMPLE DUP		C5 Blank	SPIKE+SAMPLE	-	DUP+SPIKE	SPIKE	C3 SAMPLE +	66	C4
SAMPLE ID#	PNL LOG#	(ug/L)	(ng/L)	RPD	(ug)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	SPIKE	DUP+	BLANK+ SPIKE
699-55-55-048	90-5357	<⊅L	< <b>0</b> L	NA		1630	1620		********	100.6		
699-55-55-050A	90-5358	ØL	<dl< td=""><td>RA</td><td>ΦĽ</td><td>1510</td><td>1630</td><td>1660</td><td>1630</td><td>92.6</td><td>101.8</td><td>101.8</td></dl<>	RA	ΦĽ	1510	1630	1660	1630	92.6	101.8	101.8
699-55-55-073	90-6705	<dl< td=""><td><dl< td=""><td>HA</td><td><b></b>ФL</td><td>1370</td><td>1630</td><td>1500</td><td>1630</td><td>84.0</td><td>92.0</td><td>95.7</td></dl<></td></dl<>	<dl< td=""><td>HA</td><td><b></b>ФL</td><td>1370</td><td>1630</td><td>1500</td><td>1630</td><td>84.0</td><td>92.0</td><td>95.7</td></dl<>	HA	<b></b> ФL	1370	1630	1500	1630	84.0	92.0	95.7
699-55-55-075A	90-6706	<0L	<dl< td=""><td>HĀ</td><td></td><td>1590</td><td>1620</td><td></td><td></td><td>98.1</td><td></td><td>101.2</td></dl<>	HĀ		1590	1620			98.1		101.2
699-55-55-09B	90-6709	<dl< td=""><td><dl< td=""><td>NA</td><td>ΦL</td><td>1420</td><td>1640</td><td>1530</td><td>1630</td><td>86<b>.6</b></td><td>93.9</td><td>98.8</td></dl<></td></dl<>	<dl< td=""><td>NA</td><td>ΦL</td><td>1420</td><td>1640</td><td>1530</td><td>1630</td><td>86<b>.6</b></td><td>93.9</td><td>98.8</td></dl<>	NA	ΦL	1420	1640	1530	1630	86 <b>.6</b>	93.9	98.8
699-52-57-125	90-6713	<dl< td=""><td>٩L</td><td>NA</td><td><dl< td=""><td>1390</td><td>1630</td><td>1500</td><td>1630</td><td>85.3</td><td>92.0</td><td>93.2</td></dl<></td></dl<>	٩L	NA	<dl< td=""><td>1390</td><td>1630</td><td>1500</td><td>1630</td><td>85.3</td><td>92.0</td><td>93.2</td></dl<>	1390	1630	1500	1630	85.3	92.0	93.2
							•					
DL = detection	limit of 60	ug/Ł							mean std. dev.	92.7 6.2	(C3 and C6)	96.3 ** 4.4

Note: RPD only calculated when both sample and duplicate results are >DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

TABLE 3: ANION IC ANALYSIS DATA

SULFATE (SO4)

SOLID SAMPLES

		Ei	c2		cs.	C	3	••••••	.6		% RECOVERIES	S C4
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPD	BLANK (Ug)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	(mg/Kg) SPIKE	SAMPLE + SPIKE	DUP+ SPIKE	BLANK+ SPIKE
699-52-57-077-B*	90-5351	13.3	13.3	0	ΦŁ	87.5	76.9	87.6	77.7	96.5	95.6	101.6
699-55-55-50	90-5356	8.2		_					****			-
699-55-55-075	90-6704	17.8										
699-52-57-101.5	90-6707	5.4										
699-55-55-101	90-6708	15.2	13.9	8.9		90.7	77.2			98.6		
699-55-55-125	90-6710	21.3	••			,,,,,				•		
699-55-55-125A	90-6711	16.1	15,4	4.4	ΦL	95.5	77.2	88.9	74.0	103.3	98.9	100.6
699-52-57-128	90-6712	4.4		,,,,						,		
699-52-57-153	90-6714	4.9	5.2	4.6		80.0	75.6			99.2		
699-55-55-150	90-6715	26.7				33.0			-			
								•				
DL = detection l	imit of 3.8	img/Kg (t	heoretical)			•			mean std. dev.	98.7 2.7	(C3 and C6	<b>)</b>

WATER SAMPLES

						•					\$	
		C1	C2		C5		3		·6	c3	63	£4
SAMPLE ID#	PHL LOG#	SAMPLE LOG# (Ug/L)	SAMPLE DUP (ug/L)	RPD	BLANK (Ug)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	SAMPLE + SPIKE	DUP+ SPIKE	BLANK+ SPIKE
699-55-55-048	90-5357	<dl< td=""><td><dl< td=""><td>NA</td><td></td><td>5200</td><td>4980</td><td></td><td>••••</td><td>104.4</td><td></td><td></td></dl<></td></dl<>	<dl< td=""><td>NA</td><td></td><td>5200</td><td>4980</td><td></td><td>••••</td><td>104.4</td><td></td><td></td></dl<>	NA		5200	4980		••••	104.4		
699-55-55-050A	90-5358	∢DL	<dl< td=""><td>RA.</td><td>ΦL</td><td>5200</td><td>5000</td><td>5240</td><td>4990</td><td>104.0</td><td>105.0</td><td>104.4</td></dl<>	RA.	ΦL	5200	5000	5240	4990	104.0	105.0	104.4
699-55-55-073	90-6705	<dl< td=""><td>&lt;0L</td><td>NA</td><td>ØL</td><td>4940</td><td>5000</td><td>5160</td><td>5010</td><td>98.8</td><td>103.0</td><td>102.6</td></dl<>	<0L	NA	ØL	4940	5000	5160	5010	98.8	103.0	102.6
699-55-55-075A	90-6706	<d1< td=""><td><dl< td=""><td>AA</td><td></td><td>5190</td><td>4970</td><td>* 1</td><td></td><td>104.4</td><td></td><td>103.8</td></dl<></td></d1<>	<dl< td=""><td>AA</td><td></td><td>5190</td><td>4970</td><td>* 1</td><td></td><td>104.4</td><td></td><td>103.8</td></dl<>	AA		5190	4970	* 1		104.4		103.8
699-55-55-098	90-6709	<₽L	<0L	NA	ΦL	4990	5020	4990	5000	99.4	99.8	101.0
699-52-57-125	90-6713	<dl< td=""><td><dl< td=""><td>NA</td><td>ΦF</td><td>4990</td><td>4990</td><td>4950</td><td>4980</td><td>100.0</td><td>99.4</td><td>99.8</td></dl<></td></dl<>	<dl< td=""><td>NA</td><td>ΦF</td><td>4990</td><td>4990</td><td>4950</td><td>4980</td><td>100.0</td><td>99.4</td><td>99.8</td></dl<>	NA	ΦF	4990	4990	4950	4980	100.0	99.4	99.8
_DL = detection l	imit of 250	ug/L							mean std. dev.	101.8 2.5	(C3 and C6	) 102.0 ** 1.7

Note: RPD only calculated when both sample and duplicate results are >DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

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### CYANIDE ANALYSIS RESULTS

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The samples and their accompanying QC samples were prepared by procedure PNL-ALO-270, Total Cyanide in Waters, Solids or Sludges. The methodology is comparable to CLP SOW 788 Method 335.2 distillation and colorimetric technique for the analysis of cyanide. The analysis was performed in building 3720 in the 300 area.

The procedure, PNL-ALO-270, did not reflect the correct CLP standard preparation guidelines (section 7.3.2.1 and 7.4.2.1). The analysts made a deviation to the procedure and used the client requested method, CLP SOW (788), method 335.2, for the standard preparation (page D-76). An Interim Change Notice (ICN) or revision to the procedure will be written.

During the analysis samples, the KCN spike solution was found to be 80% of the specified CLP procedure requirements by titration with  $AgNO_3$ . New KCN solution was prepared for subsequent batches.

The sample results were below the client required detection limits of 10  $\mu$ g/L and 1 mg/Kg. Sample results are all below 2 ppm; therefore free cyanide analysis was not required.

Upon review of the sample spiked data results, for soils results, the mean recovery is 98.2% with a standard deviation of 3.3% and for water results the mean recovery is 101.3% with a standard deviation of 3%. The spiked blank results mean recovery is 100% with a standard deviation of 3.7%. The conclusion is an average standard deviation of  $\pm$  4% and a bias of 0% on the average.

The general Environmental Protection Agency (EPA) hold time for total cyanide is 12 days. The hold time was not met. The delay in work is attributed internal logistics problems with Radiation Protection Technology

(RPT). There is no known impact on the results of the late analysis dates of the soil and water samples as they are below the detection limits and are preserved in basic media. The LCS standards were acquired from EPA in April of 1990 (six months prior to analysis) and are in basic media and produce satisfactory recoveries (mean of 97%); therefore the late analyses of the samples is unlikely to have any impact on the results.

#### SOLID SAMPLES -----

			<b>G1</b>		G2		G5		3	G	6	C3	X RECOVERIE C6	s
SAMPLE ID#	PHL LOGA		SAMPLE (mg/Kg)		PLE DUP	RPD	BLANK (Ug)	SPIKE+SAMPLE (mg/Kg) .	SPIKE (mg/Kg)	BLANK+SP1KE (mg/Kg)	SPIKE (mg/Kg)	SAMPLE + SPIKE	BLANK+ SPIKE	LCS Sample
699-55-55-050	90-5356	(a)	√ni	นร	0.1	HA	0.5	7.67	8.32	8.2	8.3	92.2	99.6	95.8
699-55-55-075	90-6704	(b)		UJ.	∢DL	NA.	<dl< td=""><td>9.52</td><td>9.94</td><td>8.9</td><td>9.9</td><td>95.8</td><td>91.5</td><td>100.2</td></dl<>	9.52	9.94	8.9	9.9	95.8	91.5	100.2
699-52-57-101.5	90-6707	(c)	ΦL	UJ	<dl< td=""><td>NA</td><td>0.1</td><td>10.29</td><td>10.15</td><td>10.19</td><td>10.18</td><td>101.1</td><td>101.8</td><td>106.6</td></dl<>	NA	0.1	10.29	10.15	10.19	10.18	101.1	101.8	106.6
699-55-55-101	90-6708	(d)	0.1		0.2	7	0.3	10.43	10.10	9.6	10.1	103.2	97.6	88.7
699-55-57-125	90-6710	(e)			人 0.1	0	0.4	9.75	9.99	9.99	9.99	97.6	98.6	106.4
699-52-57-125A	90-6711	(b)	<b>√</b> 0L	いず	Č∢DL	NA	<dl< td=""><td>9.92</td><td>10.00</td><td>9.9</td><td>10</td><td>99.1</td><td>98.1</td><td>107.4</td></dl<>	9.92	10.00	9.9	10	99.1	98.1	107.4
699-52-57-128	90-6712	(b)	<⊅L	uJ	<dl< td=""><td>KA</td><td><dl< td=""><td>9.18</td><td>9.26</td><td>8.99</td><td>9.26</td><td>99.1</td><td>98.1</td><td>91.4</td></dl<></td></dl<>	KA	<dl< td=""><td>9.18</td><td>9.26</td><td>8.99</td><td>9.26</td><td>99.1</td><td>98.1</td><td>91.4</td></dl<>	9.18	9.26	8.99	9.26	99.1	98.1	91.4
699-52-57-153	90-6714	(d)	<b>⊲</b> 0L	uΣ	<dl< td=""><td>NA</td><td><dl< td=""><td>9,68</td><td>9.67</td><td>9.68</td><td>9.67</td><td>100.1</td><td>101.9</td><td>89.6</td></dl<></td></dl<>	NA	<dl< td=""><td>9,68</td><td>9.67</td><td>9.68</td><td>9.67</td><td>100.1</td><td>101.9</td><td>89.6</td></dl<>	9,68	9.67	9.68	9.67	100.1	101.9	89.6
699-55-55-150	90-6715	(d)	ΦL	ムブ	<dl< td=""><td>NA</td><td><dl< td=""><td>8.29</td><td>8.68</td><td>10,29</td><td>8.68</td><td>95.5</td><td>102.7</td><td>91.9</td></dl<></td></dl<>	NA	<dl< td=""><td>8.29</td><td>8.68</td><td>10,29</td><td>8.68</td><td>95.5</td><td>102.7</td><td>91.9</td></dl<>	8.29	8.68	10,29	8.68	95.5	102.7	91.9
										•				•••••
											mean	98.2	98.9	97.6
	•										std. dev.	3.3	3.4	7.7

WATER SAMPLES -----

													% RECOVERIE	S
			<b>G1</b>		G2		G5	G	3		i6	C3	C6	
			SAMPLE	SA	MPLE DUP		BLANK	SPIKE+SAMPLE	SPIKE	BLANK+SPIKE	SPIKE	SAMPLE +	BLANK+	LCS
SAMPLE ID#	PNL LOG#	ł	(ug/L)		(Ug/L)	RPD	(ug)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	SPIKE	SPIKE	SAMPLE
/00-EE EE-0/8	00.5757	•	. 4 6		4 0	£ £	~NI	38.8	39.82	70 0	70 07	חל ל	00 77	70 F
699-55-55-048		<b>(a</b> )	1.5	-	1.8	5.5	<dl< td=""><td></td><td></td><td>38.8</td><td>39.82</td><td><del>9</del>7.5</td><td>98.33</td><td>90.5</td></dl<>			38.8	39.82	<del>9</del> 7.5	98.33	90.5
699-55-55-050A	90-5358	(a)	) ⊲ા	ムナ	≪DL	нA	<dl< td=""><td>38.76</td><td>39.82</td><td>38.76</td><td>39.82</td><td>97.3</td><td>98.22</td><td>94.7</td></dl<>	38.76	39.82	38.76	39.82	97.3	98.22	94.7
699-55-55-073	90-6705	(a)	) <dl< td=""><td>WJ</td><td><dl< td=""><td>NA</td><td><dl< td=""><td>41.07</td><td>39.82</td><td>41.07</td><td>39.82</td><td>103.2</td><td>103.76</td><td>101.9</td></dl<></td></dl<></td></dl<>	WJ	<dl< td=""><td>NA</td><td><dl< td=""><td>41.07</td><td>39.82</td><td>41.07</td><td>39.82</td><td>103.2</td><td>103.76</td><td>101.9</td></dl<></td></dl<>	NA	<dl< td=""><td>41.07</td><td>39.82</td><td>41.07</td><td>39.82</td><td>103.2</td><td>103.76</td><td>101.9</td></dl<>	41.07	39.82	41.07	39.82	103.2	103.76	101.9
699-55-55-075A	90-6706	(c)	<b>)</b>	uJ	* <⊅L	NA	<dl< td=""><td>42.66</td><td>39.82</td><td>42.66</td><td>39.82</td><td>107.1</td><td>105.79</td><td>98.7</td></dl<>	42.66	39.82	42.66	39.82	107.1	105.79	98.7
699-55-55-098	90-6709	(f)	<b>)</b> <0L		<dl< td=""><td>нA</td><td><dl< td=""><td>40.97</td><td>39.82</td><td>40.97</td><td>39.82</td><td>102.9</td><td>103.79</td><td>99.4</td></dl<></td></dl<>	нA	<dl< td=""><td>40.97</td><td>39.82</td><td>40.97</td><td>39.82</td><td>102.9</td><td>103.79</td><td>99.4</td></dl<>	40.97	39.82	40.97	39.82	102.9	103.79	99.4
699-52-57-125	90-6713	(f)	<b>⊅</b> L		<dl< td=""><td>НA</td><td><dl< td=""><td>47.52</td><td>47.78</td><td>47.52</td><td>47.78</td><td>99.5</td><td>105.21</td><td>96.9</td></dl<></td></dl<>	НA	<dl< td=""><td>47.52</td><td>47.78</td><td>47.52</td><td>47.78</td><td>99.5</td><td>105.21</td><td>96.9</td></dl<>	47.52	47.78	47.52	47.78	99.5	105.21	96.9
												*******		*******
								•			mean	101.3	102.5	97.0
											std. dev.	3.8	3.4	4.0

Detection limits for water = 1 ug/LDetection limits for soil = 0.1-0.4 mg/Kg (theoretical)

- (a) Hold time missed by 6 days.
  (b) Hold time missed by 5 days.
  (c) Hold time missed by 4 days.
  (d) Hold time missed by 3 days.
  (e) Hold time missed by 1 day.
  (f) Hold time missed by 2 days.

15

### FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 ppm, therefore free cyanide analysis was not performed on the samples in this set.

<u>Table 5</u>: Free Cyanide Analysis Data

No data necessary.

#### GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestates were then analyzed by graphite furnace atomic absorption (GFAAS) following procedure PNL-ALO-215, Selenium (Atomic Absorption, Furnace Method), for selenium and PNL-ALO-216, Bismuth (Atomic Absorption, Furnace Technique), for bismuth. Se and Bi analysis methodologies are consistent with CLP SOW 788 Method 270.2. Digestion of samples was performed in building 325 and analysis by GFAAS was conducted in building 325.

Analysis for Se and Bi was conducted on a Perkin-Elmer 5100/HGA 600 (not equipped with a Zeeman background correction device). The quarterly instrument detection limit (IDL) for Se was found to be 1.3  $\mu$ g/L. The corresponding IDL for Bi was found to be 4.3  $\mu$ g/L.

A preliminary analysis of the samples was performed to determine the dilution factor necessary to bring the concentration to mid-range in the calibration curve. All samples were determined to have Se and Bi levels below the respective detection limits 3.25  $\mu$ g/L and 10.75  $\mu$ g/L. Detection limit was defined as 2.5 times the IDL.

The data are reported in Table 6 for selenium results and Table 7 for bismuth results. Each table has a summary results table followed by batch results tables for easy verification of control standards and quality control samples analyzed per batch.

Upon review of the data tables for selenium (Table 6) and bismuth (Table 7), the average recovery of selenium spike in waters is 95.4% with a

standard deviation of 6.9%, the average recovery of selenium spike in soils is 75.3% with a standard deviation of 35.6%, the average recovery of bismuth spike in waters is 102.7% with a standard deviation of 5.3% and the average recovery of bismuth spike in soils is 89.9% with a standard deviation of 10.5%. A precision determined from the duplicate sample analysis is not possible since the results are below detection limits. Therefore, the overall precision and bias based on spike recovery information for all spike samples associated with this set of data are as follows:

	Ave % Rec	Ave % Bias	Std Dev of Rec
Selenium in water	95.4	-5	6.9
Selenium in soil	75.3	-25	35.6
Bismuth in water	102.7	+3	5.3
Bismuth in soil	89.9	-10	10.5

The large bias and poor precision associated with the analysis of selenium in soil samples is attributed to the low concentrations of selenium and spike standard in the samples and matrix interference (of iron) in the samples. The matrix interference of iron interferes in the background determination in selenium analysis. A Zeeman background correction attachment is necessary for this matrix correction. The data in Tables 6 and 7 are flagged with appropriate CLP (as defined in CLP SOW 7/88, pages B-19 and 20) flags where necessary. ICB, CCB, ICV, CRA, etc. are as defined in the CLP SOW 7/88, section E.

The CLP SOW 788 specified hold time of 180 days was met as well as the contract required hold time of 120 days.

SOLID SAMPLES

												•••••	% RECOVERII	Ş
		<b>B1</b>		B2			B5		3		6	83	B6	24
		SAMPLE	Spike	SAMPLE DUP	Spike		BLANK	SPIKE+SAMPLE	SPIKE	BLANK+SPIKE	SPIKE	SAMPLE +	BLANK+	LCS (d)
SAMPLE 1D#	PHL LOG# (				X Rec	RPD (c)	(Ug)	(ug/L)	(ug/L) (b)	(ug/L)	(ug/L) (b)	SPIKE	SPIKE	SAMPLE
*******	********									*********	******	******		
699-55-55-050	90-5356	<idl c<="" td=""><td>1T</td><td>&lt;1DL</td><td></td><td></td><td><idl< td=""><td><idl< td=""><td>50</td><td>&lt;1DL</td><td>50</td><td>4</td><td>4</td><td>89</td></idl<></td></idl<></td></idl>	1T	<1DL			<idl< td=""><td><idl< td=""><td>50</td><td>&lt;1DL</td><td>50</td><td>4</td><td>4</td><td>89</td></idl<></td></idl<>	<idl< td=""><td>50</td><td>&lt;1DL</td><td>50</td><td>4</td><td>4</td><td>89</td></idl<>	50	<1DL	50	4	4	89
699-55-55-050	90-5356-AS	18	87	13.5	65	28.6		21.2	20	16.9	20	96	74	
699-55-55-075	90-6704	<idl c<="" td=""><td>NJ.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	NJ.											
699-55-55-075	90-6704-AS	18.9	95							_				•
699-52-57-101.5	90-6707	<1DL L	IJ							•				
699-52-57-101.5	90-6707-AS	18.7	95											
699-55-55-101	90-6708	<idl c<="" td=""><td>N.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	N.											
699-55-55-101	90-6708-AS	19.1	96											
699-55-55-125	90-6710	<idl &<="" td=""><td>ゴ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	ゴ											
699-55-55-125	90-6710-AS	18.9	95											
699-55-55-125-A	90-6711	<idl &<="" td=""><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	12											
699-55-55-125-A	90-6711-AS	19.2	97											
699-52-57-128	90-6712	<idl l<="" td=""><td>J</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	J											
699-52-57-128	90-6712-AS	19.6	99											
699-52-57-153	90-6714	<idl td="" u<=""><td>J</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	J											
699-52-57-153	90-6714-AS	18.8	95											
699-55-55-150	90-6715	<idl td="" v<=""><td>ŭ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	ŭ											
699-55-55-150	90-6715-AS	16.8	85		/									
				1										
DATES CAUSIES														

WATER SAMPLES

---- % RECOVERIES-----83 85 B6 87 SAMPLE + SPIKE+SAMPLE SPIKE BLANK+SPIKE SPIKE SAMPLE Spike SAMPLE DUP Spike BLANK **BLARK+** SPIKE SAMPLE ID# (Ug/L) (ug/L) (b) (ug/L) (dg/L) (b) SPIKE SP1KE BLANK PNL LOG# (a)(ug/L) X Rec (Ug/L) X Rec RPD (c) (ug) 699-55-55-048 90-5357 **ФL** 102 699-55-55-048 90-5357-AS 20.4 699-55-55-050-A 90-5358 ΦL 699-55-55-050-A 90-5358-AS 19.7 98 50 49.2 50 48.2 90 699-55-55-073 90-6705 **₽L** ΦL ø٤ 98 699-55-55-073 90-6705-AS 20 98 21.4 107 6.8 699-55-55-075-A 90-6706 40L 699-55-55-075-A 90-6706-AS 21.5 108 699-55-55-098 90-6709 <⊅L 699-55-55-098 90-6709-AS 21.5 108 699-52-57-125 90-6713 ΦL 699-52-57-125 90-6713-AS 21.9 109

Instrument Detection Limits (IDL) for water = 2.9 ug/L

Method Detection Limit (DL) for water = 1DL x 2.5 = 7.25 ug/L

Contract Required Detection Limit (CRDL) = 60 ug/L

Instrument Detection Limit (IDL) for soil in solution = 4.3 ug/L = 0.3 mg/Kg (calculated using average sample size of 1.5 g)

Method Detection Limit (DL) for soils in solution = 1DL x 2.5 = 10.75 ug/L = 0.72 mg/Kg (calculated using average sample size of 1.5 g)

Contract Required Detection Limit (CRDL) = 10 ug/g (10 mg/Kg)

7

<sup>(</sup>a) Analytical Spike (AS) = 20 ug/L

<sup>(</sup>b) Pre-digest spike = 50 ug/l

<sup>(</sup>c) RPD only calculated if both sample and duplicate are greater than detection limit.

<sup>(</sup>d) 64 = LCS-0287 + 40 ug Bi spike

#### TABLE 6: SELENIUM ANALYSIS DATA

#### ACID EXTRACTABLE SELENIUM IN SAMPLES

#### SOLID SAMPLES

		_						-	_		_	•••••	⊼ RECOVER18	\$
•		81		B2			B5		3		6	13	86	84
		SAMPLE	Spike	SAHPLE DUP	Spike		BLANK	SPIKE+SAMPLE	SPIKE	BLANK+SPIKE	SPIKE	SAMPLE +	BLANK+	LCS
SAMPLE ID#	PHL LOG# (	)(mg/Kg)	X Rec	(mg/Kg)	X Rec	RPD (c)	(pg)	(ug/L)	(ug/L) (b)	(ug/L)	(ug/L) (b)	SPIKE	SPIKE	SAMPLE
**********			*****	********						*******	********	******	*******	
699-55-55-050	90-5356	<idl (<="" td=""><td>u5</td><td>&lt;1DL</td><td></td><td></td><td><idl< td=""><td>&lt;1DL</td><td>25.00</td><td><idl< td=""><td>25</td><td>8</td><td>0</td><td>106</td></idl<></td></idl<></td></idl>	u5	<1DL			<idl< td=""><td>&lt;1DL</td><td>25.00</td><td><idl< td=""><td>25</td><td>8</td><td>0</td><td>106</td></idl<></td></idl<>	<1DL	25.00	<idl< td=""><td>25</td><td>8</td><td>0</td><td>106</td></idl<>	25	8	0	106
699-55-55-050	90-5356-AS	4.8	119	4.4	116	8.7	11.0	6.8	10	7.3	10	122	123	•
699-55-55-075	90-6704	<idl (<="" td=""><td>uJ.</td><td></td><td></td><td></td><td>•</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	uJ.				•							
699-55-55-075	90-6704-AS	3.4	41											
699-52-57-101.5	90-6707	<10L	ur											
699-52-57-101.5	90-6707-AS	3.7	39							•				
699-55-55-101	90-6708	<1DL	us i											
699-55-55-101	90-6708-AS	4.1	43											
699-55-55-125	90-6710	<idl l<="" td=""><td>び</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>	び											
699-55-55-125	90-6710-AS	4.1	48											
699-55-55-125-A	90-6711	<1DL (												
699-55-55-125-A	90-6711-AS	3.4	36											
699-52-57-128	90-6712	<idl td="" u<=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></idl>												
699-52-57-128	90-6712-AS	4.4	76					•						
		***												

WATER SAMPLES

699-52-57-153

699-52-57-153

699-55-55-150

699-55-55-150

A 12/30/90

			$U_{\perp}$			_		_				% RECOVERIE	
	61		B2			B5 ·	8	3	B	6	23	В6	84
	SAMPLE	Spike .	SAMPLE DUP	Spike		BLAHK	SPIKE+SAHPLE	SPIKE	BLANK+SPIKE	SPIKE	SAMPLE +	BLANK+	LCS
SAMPLE ID# PHL LOG	(a)(ug/L)	X Rec	(ug/L)	X Rec	RPD (c)	(ug)	(ug/L)	(ug/L) (b)	(Ug/L)	(Ug/L) (b)	SPIKE	SPIKE	SAMPLE
************	•••	• •••••	•••••	****		••••	**********	*******	********	*******	*******	*******	*****
699-55-55-048 90-5357	Φl												
699-55-55-048 90-5357	AS 10.2	102											
699-55-55-050-A 90-5358	¢۵L	i											
699-55-55-050-A 90-5358	AS 9.0	85											
699-55-55-073 90-6705	<01		<dl< td=""><td></td><td></td><td>Φľ</td><td>22.3</td><td>25</td><td>21.4</td><td>25</td><td>89</td><td>86</td><td>93</td></dl<>			Φľ	22.3	25	21.4	25	89	86	93
699-55-55-073 90-6705	AS 9.5	101	9.9	97	1.0	10.3							• -
699-55-55-075-A 90-6706	<b>&lt;</b> DL												
699-55-55-075-A 90-6706	AS 9.8	98										-	
699-55-55-098 90-6709	<dl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>												
699-55-55-098 90-6709	AS 9.9	99											
699-52-57-125 90-6713	<dl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></dl<>												
699-52-57-125 90-6713	AS 10.2	102											

Instrument Detection Limits (IDL) for water = 1.5 ug/L
Hethod Detection Limit (DL) for water = 1DL x 2.5 = 3.75 ug/L
Contract Required Detection Limit (CRDL) = 5 ug/L
Instrument Detection Limit (IDL) for soil in solution = 1.3 ug/L = 0.1 mg/Kg (calculated using average sample size of 1.5 g)
Method Detection Limit (DL) for soils in solution = IDL x 2.5 = 3.25 ug/L = 0.22 mg/Kg (calculated using average sample size of 1.5 g)
Contract Required Detection Limit (CRDL) = 0.5 ug/g (0.5 mg/Kg)

- (a) Analytical Spike (AS) = 10 ug/L
- (b) Pre-digest spike = 25 ug/l for B3, B4 and B6

4.4 <10L US

4.3

2.0

<IDL UJ

70

70

90-6714

90-6715

90-6714-AS

90-6715-AS

(c) RPD only calculated if both sample and duplicate are greater than detection limit.

# B1 - WESTINGHOUSE CHAIN OF CUSTODY, SAMPLE ANALYSIS REQUEST FORMS AND PNL SAMPLE RECEIPT FORMS

Deli	vered by: R. STEEFEER Date/Time: 10/11/90 _ 13.00 III-1
	eived by: Mike UKIE
Cust	tomer Sample Number(s): <u>699-55-55-050</u>
	Sample Number(s): 90-5356
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): RAS & Recever 7 For AJALLICE
3.	
	Present Absent
,	If Present, Condition: Coab
4.	or on Sample Vial. N/A
•	Notes:
. 5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). $\circ \kappa$
6.	Condition of Sample Vials. OK
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies. $\mathcal{NIA}$

Deli	vered by: R. STEFFLER Date/Time: 10/11/90 1300 Hrs
	eived by: MIKE URIE
Cust	tomer Sample Number(s): 699-55-55-048
ALO	Sample Number(s): 90-5357
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): RAS & REQUEST FOR AMALYSIS
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions
	Present Absent
	If Present, Condition: <
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
	Notes: Notes:
.5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). $o$
6.	Condition of Sample Vials. $oK$
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies. $\sim /A$

Deliv	ered by: R STEFFLER	Date/Time: <u>/0////90</u>	1300 Hrs
	ved by: Mike URIE	_ <del>_</del>	
Custo	mer Sample Number(s): 6 99-55_	55 - 650A	· · · · · · · · · · · · · · · · · · ·
ALO S	ample Number(s): 90-5358		
1.	Customer Chain-of-Custody Form: Pre	sent Absent	<del></del>
2.	Additional Shipping Forms (list):	PAS & REQUEST FOR	. Analyses
3.	Custody Seals on Shipping and/or Sam	ple Containers and thei	r Conditions
	Present Absent	_	
	If Present, Condition: ()/<		·
	Sample Tag(s) ID Numbers if not Reco or on Sample Vial.	orded on the Chain-of-Cu	stody Record
•	Notes: N/A		
. <b>5.</b>	Condition of Shipping Container (Versamples are at refrigerated temperat	rify that ice still exis	ts such that
6.	Condition of Sample Vials. $\omega/\!<$		
7.	Verification of Agreement or Nonagro Documents. A GR <	eement of Information or	n Receiving
8.	Resolution of Problems or Discrepan	cies.	
	NA		

Westinghouse Hanford Company	, CHAIN O	FCUSTODY
Company Contact WENDUS THOMOSON	Telepho	on (504) 373-3818
Sample Collected by W.S. THOMPSON	Date 15/11/90	( )
1 100 Kersel 100 1 100 100 100 100 100 100 100 100	-55-55 ; WALSITE IN 600 AREA	
Ice Chest No. SLEEPY POLY COOLER	-	ge No. WHC-N-287-2-pg 46-48
Remarks SAMOLES COLLECTED FOR ANAL	YSIS OF PARIMIETERS OF INTER	EST SUPPORTING the 200-BP-1
RI/FS. (SEE STATEMENT OF WORK		
Bill of Lading No	Offsite Property No.	NA
Method of Shipment HAND CARRY SA	ME DAY TO 326 PNL LAB	BY ASL SAMPLE VAN.
Shipped to 325 FIVE LAPORATORS	,	•
Possible Sample Hazards NONE INDICAT		UTS.
( KEEP CHILLED ON ICE D	DRING TRANSPORTATION)	• ,
	Sample Identification	_
199-55-55-050		<u> </u>
2, 1-liter, glass (le fue "By it	HB. ); ANALYSIS OF 200-B	P-1 DAPAMETERS OF INTEREST
699-55-55-048	<del></del> _	-8
1,500 ml., glass, water; che	envical analysis of Anions	1 Testing 200 melly
, 1-liter; glass; unter; 2ml.		
	HNO2 renalysts of metals & ro	
\		J
1699-55-55-050A		
1,500 ml, glass; water; chenica	I analysis of Anions & Trit	ind South
3,1-liter: glass; water; 2ml. Na O+		
3, 1-liter; gloss; water; 2ml. HND	z; analycis of metals & rad	ischemical analysis) KNS
		0
		Z121
	Chain of Possession .	
Relinquished by: W.S. Thompson Red Standy Shompson.	ceived by: K.7 St. 18 hr	Date/Time: 0955 10/11/90 10/11/90
Relinquished by: Rec	ভাগৰব চ্যু: //	Date/Timé:
1.3. Sterrel	11000-	10/190 12:55
Rec Rec	eived by:	Date/Time:
	•	
Reco	eived by:	Date/fime;

[V	Westinghouse Hanford Company		, SAMPLE ANALYSIS REQUEST					
		PART I: FIELD S	ECTION					
	.S. Thompson	Date Sampled 10/11/90 Time 0845 hour 18.2. Staffler Telephone (509 1.373-3818 0800)						
Company Con	tact 1U:S. Thompson	2-BP-1 Pa	rametres of Interest					
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested					
699-55-5	m / / .		w ( & full) analysis of 200 BP-1 tamm					
7 766-22-2		<u>Onl clear flu</u> litter antiero	lass, and NaOH; CNEFFEEN					
		7	ust 2nd 4NO; netals +ralischemical					
3 1.99-55-55	-050A, water 1, 500	tu anteral	( Theread 0)					
	water 3,)-1	to, amber q	lass, 2ml HNOz, motals - radiochemical					
<u></u>		,						
		7/15						
		ws						
Field Information	tion == <u>lamples</u> sen							
KI/FS		icatul be	sied institutes					
Special Handl	ing and/or storage Loup	exieted O						
		PART II: LABORATO	DRY SECTION C					
received by		Title <u>6</u> 0	out Loach Date 10/11/ED					
alysis Requ	Jirea							

indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

Nel i	vered by: 5/40 Mb125
Rece	eived by: Milling 375A
Cust	comer Sample Number(s): 49-50-538-225, 699-55-55-075-073-0747 12-11-90
ALO	Sample Number(s): 40.6703, 90-6704, 90-6705, 90-6706
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): $R \leq R$
3.	Request for AntilySS Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: (2001)
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠.	Notes:
<sub>,</sub> 5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents
8.	
	W/A

Westinghouse Hanford Company	. CHAIN C	F CUSTODY
Company Contact. W.S. Thompso Sample Collected by w.S. Thompso	1/82. Stiller Date 10/12/90	one (509)373-3818 Time /335
Sample Locations 199-50-538 Ice Chest No	S Field Logbook and Pa	ige No. <u>WHC-N - 287 - 2p. 52-5</u>
yur 200-BD-1 PT /FS.	nelyed for TOC (I	
Method of Shipment <u>hand</u> car Shipped to <u>325 PNL</u> (AB.	Offsite Property No.	
Possible Sample Hazards Your in	dicated with field i	notuments
1699-50-538-225	Sample Identification	
1, 120 me, anwer glass.	sail analysis of Total	1 Gramic Carbon toc
	<del></del>	
	Chain of Possession .	
Relinquished by: W. S Thompson F	Received by: 8.2. Steffler	Date/Time: 10/12/90 1350 hrs.
R. Z. Styll	Received by:	Date/Time: / // // 10/15/40 /1.25
	leceived by:	Date/Time:
Ranguished by:	leceived by:	Date/Time:

(3	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST
	•	PART I: FIELD SE	CTION
	1.5. Thompson /R		Telephone (609) 373 - 38 · 8
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested Sussul Mathalas
,99-60-63	B-225 1.120 ml. an	ver gass =	out analysis of Total Organic Contr
<del></del>			
<del></del>			
······································	<del>                                     </del>		
<del></del>			<del></del>
	<del> </del>		<del></del>
			<del></del>
<del></del>			
	<u> </u>	<u> </u>	
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	<del> </del>	<del> </del>	
<del></del>	<del> </del>		
<del></del>	<del>                                     </del>	<del> </del>	
	<u>/                                    </u>	<u> </u>	
/_	<del> </del>	<del> </del>	
	tion = Sample to	be analy	ged for Total organic Carlom G
Special Hand	ling and/or Storage Perp	ohilled	
		PARTII: LABORATO	RY SECTION
9ereived by	JNW M	Title	oup Leade 10/05/90

Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

Westinghouse Hanford Company	CHAIN O	FCUSTODY			
Company Contact. Upndu S. The	Ompson Telepho	ine (509) 373-3818			
Sample Collected by W.S. Thongs	on 1825 by Date 10/15/90	Time 0750 19835 0845			
Sample Locations 1099-55-55 used	loite North a 200 EAST		•		
Ice Chest No. LEpsilon # 5'pou	Coolin Field Logbook and Pag	10 No. WHC-N-287-2 pg	5 S		
Remarks Samples to be a	nalyzed for 200-BP-1.	Bramiterson Interest			
See statement of we	it of i	0	1		
Bill of Lading No	Offsite Property No.				
Method of Shipment hand ca	rry, some day (pres		4		
Shipped to 325 PNL LAROY	ATONY (300 AKEA)	O. vai	+		
Possible Sample Hazards	rdibated with fulo	indisconents.			
	Sample Identification				
(D 699-55-55-073	somple identification 2.				
1,500ml. Clearglass, water	animist tribing		-		
3, 1-liter; amberglass, unter					
	2 and HND, metals & radiceher	nicals			
The state of the s	7	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1		
1 699-55-55-075		All SAMPLES			
2 1-liter Clear glass So	oce, (1/2 full, as requested by la	6-) 70 AE			
		ANALYZED			
@ 699-55-55 - 075A		FOR			
	1,500ml. Clear glass, water, anions + tritium 2003P-1				
3, 1-liter, ambergense, water		PARAMETERS	. ]		
	ry 2 ml. HNO3, metals + racle				
		INTEREST			
		(see statem	برار		
	•	17 work)	7		
			1		
	Chain of Possession		4		
Relinquished by: W.S. Thompson		Date/Time:	-		
Frendy Shompson	RI Hul				
Relinquished by:	Received by:	10/15/90 09/5/hv	4		
13 M	-/hus//hi-	10/15/90 11:25			
Relinquished by:	Received by:	Date/Time:	4		
	•				
linguished by:	Received by:	Date/Time:	7		
			· -		

Westinghouse Hanford Company			SAMPLE ANALYSIS REQUEST	
	•	PART I: FIELD SI	ection :	
Collector W.S.	S. Thompson / R.Z. S. R. act Wendy S. Thonipson	TRER 00	Date Sampled <u>10 /15/90</u> Tim Telephone ( <u>509_) 373-384</u>	e <u>0750</u> hours p 0835 0845
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	terest
699-55-55	-073		see statement of wo	ik)
	1500 ml, cleargiass,	water anu	ns x tritium 0 -	
	3 1-liter: amberalass	water 2ml 1	VadH: CN + FreeCN	
	7,1-liter; ambergiess	untir, 2ml	VaDH; CN & FreeCN HNOz; metals & radiochemia	21
699-65-5	5-075			ALL SAM
	2, 1-liter, clear glas	+: Soil: 1/2 W	(ab (equested)	TO BE
				ANALVZED
699-55-5	5-075A			FOR
	1,500 ml, clear alass 1	WEET ONLINES &	tritiun	200-BP-1
•	1, 500 ml clear glass 1. 3, 1- liter the guss.	NUMBER 201 NO	OH: CNAFACON	PARAMETER
<del></del>	3 1-leter ander day	Water 2nd 4	NOz. metak + radiochemicals	OF
				INTEREST
				( all states
				as work
			1,151	0
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		X	
/				1
				<del>/</del>
				<del></del>
Field Informat	•	SAMPLES TO I	PE ANKLYTED FOR 200-BP	I PARAMET
112	TEARNS INDICATED U	IITH FIELD	HAND CARRY, TO 325 PNL INSTRUMENTS.	2.490еатоку
		PARTII: LABORATO	DRY SECTION	
ے ereived by? alysis Requal		Title	voup Leader Date	10/15/90

B01-011

	vered by: 5/esses Date/Time: 10/16/90 12:15
Del i	vered by: Date/Time: 10/16/90 / X:
Rece	ived by: M W Chri
Cust	omer Sample Number(s): 699-52-57 -/0/, 5
	Sample Number(s): 90-6707
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list):
3.	RSR Deputed for Analysis Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: 6000
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial/.
	Notes:
.5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials.
	600 n
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents:
	Haree
8.	Resolution of Problems or Discrepancies.
	NA

Westinghouse Hanford Company	. CHAIN O	FCUSTODY		
Company Contact Wendy S. Thomps	on Telepho	ine (509) 373-3818		
Sample Collected by Wald Thempson				
Sample Locations 699-50-67 we	28xte. North 0 200 E787 (1	OO AREA)		
Ice Chest No., MD-1	, , , , , , , , , , , , , , , , , , ,			
Remarks Samples to be anal	<u> </u>	F 21		
(see statement on work				
Bill of Lading No. W/A	Offsite Property No.	NA		
Method of Shipment Hand Carry				
Shipped to 326 PNI LANDRATO		•		
Possible Sample Hazards Trong ind		robruments		
		•		
116952-576 101.80-670	2 sample Identification			
- Fliter Marchan soi	1: analycis of 200BP-1	Parameterno Statowit		
, , , , , , , , , , , , , , , , , , , ,	(oce Stateme			
		8		
\ <del></del>				
<del></del>				
	<del></del>			
	Chain of Possession			
	ceived by: R.Z. Steffler	Date/Time:		
It Shampson	R. ? Still	10/16/90 1122		
Relinquished by: RZ Stelller Re	SENSODY 11 MN URIC	Date/Time:		
H.J. Steffe	MW/hic	10/16/90 12:15		
elinquished by:	ceived by:	Date/Time:		
	·			
Resilinquished by:	ceived by:	Date/Time:		

(V	Westinghouse SAMPLE ANALYSIS REQUEST		SAMPLE ANALYSIS REQUEST	
. PART I: FIELD SECTION .				
ollector <u>We</u> company Cont	ndy S. Thompson/R.Z.S tact 10.S. Thompson	steffur	Date Sampled 10/16/90 Time 1045 hours Telephone (509 ) 373-38/8	
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	
699-52-57	101.5			
	2, t-liter, clear glass;	Soil: anal	sip of 200-BD-1 Parameters of Inter Dec Statement of work)	
· · · · · · · · · · · · · · · · · · ·	720		Dee Statement of work)	
			·	
<del></del>				
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<del> </del>	<u> </u>	<b></b>		
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<del></del>				
***************************************	/			
	1			
ield Information	ting the 200-15P1 K	°I/F\$	alipis of Arameters of Interest	
		ncicated w		
		PART II: LABORATO	ORY SECTION)	
eceived by	M/11/1/2	Title (in)	oup Lande Date D/16/90	

(\*\*\* ۲ź,

Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

Deli	vered by: Steller Date/Time: 10/17/90 10.02
	ived by: //ril
Cust	omer Sample Number(s): <u>699-55-55-101</u> 699-55-55-098
ALO	Sample Number(s): 90-6708 90-6709
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list):
3.	Reguest for Analysis Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: GOOV
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
••	Notes:
. 5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials.
_	6000
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.
	N/A

Westinghous Company	e Hanford		, CHAIN O	FCUSTODY .	
Company Contact.	Thompson	SLIM	Telepho	one (509)373	
Sample Collected by 11					810; 0630·
Ice Chest No. 11 Albha				<del>,</del>	1-287-2 Ex160-6
Remarks	<del></del>	remod dar			
	ent by work	112	•	rcountace	of oncess.
Bill of Lading No.	NA	1	ite Property No.	MA	
Method of Shipment		4: some			ASL Sample.
Shipped to 325 P		(APER)	· ()		· van
Possible Sample Hazard	· none ind	icated un	th field u	notrumen	<i>to</i>
			0		······································
1) 699-55-55-10	- (90-670B	Sample Identifi	cation		
1,2 liter; clear,	1 10	); analysi	s of acoust	1 Paramete	ro dy Interest
100 00 00	100-109	<i>_</i>		<del></del>	0 .
V	90 90-610			<del></del>	<del></del>
	colastivater:			dianter in 1	7 Parameter
3, 1-liter; antingais; unter; 2ml. HIVOz; metals + radiochomicals ( of 3 1-liter; antingas; unter; 2ml NaOH; cn & Free CN ) Interest					
	moid any arrest	iz na nach; ei	V FIEE CT	<u>v</u>	) bluelly
	<del></del>			•	
		<del></del>			<del></del>
		······································		187	
	P				
					<del></del>
	•	$\sum Z$			
		Chain of Posse			
Relinquished by: W.S	Thompon less		Sleffler	Date (7)	
Londys Hom		20 Hill	21111116	Date/Time:	
Relinquished by:		j. Achter j. j.		/0/17/90 Date/Time:	0900 hrs.
R. 3. St. 11/2				10/17/90	10.02
elinquished by:	Reci	cived by:	<del></del>	Date/Time:	, -, 0 -
	1.00		•	-ate inite;	
Relinquished by:	Reci	rived by:		Date/Time:	•
,		R01-016		Date mile:	i

(max)

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PNL-ALO-051, Rev. 0 Exhibit 1 Page 1 of 1

SAMPLE RECEIPT FORM
Delivered by: Date/Time: 10/19/90 10:3
Delivered by: Uate/lime: 10/19/40 1000
Received by: Soil Soil
Customer Sample Number(s): -99-55-55-125, 125A 699-52-57-128,
ALO Sample Number(s) 90-6710, 80-6711, 90-6712, 90-6713
1. Customer Chain-of-Custody Form: PresentAbsent
2. Additional Shipping Forms (list):
Regulat for Analysis  3. Custody Seals on Shipping and/or Sample Containers and their Conditions.
Present Absent
If Present, Condition: 600P
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial,
Notes: Notes:
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6. Condition of Sample Vials.
Good
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.
8. Resolution of Problems or Discrepancies
NA
<i>l</i>

Westinghouse Hanford Company	CHAIN OF	CUSTODY		
Company Contact. W.S. Thompson		ne (509) 313-3818		
Sample Collected by w.s. Thomps	1) 1/2. Steffier Date 101 19190	Time 1047, 1047		
Sample Locations 1099-55-55 wel				
Ice Chest No. "SLEEPY" polypooler	rield Logodok and Pag	e No. WHC-N-287-2 pg 66-64		
Remarks Samples to be analysed for 200-BP-1 Parameters of Interest .  ( See statement more for 200-BP-1 RI/FS)				
Bill of Lading No. MA	Offsite Property No. A	IA		
Method of Shipment hand Carry	to 325 ANL LAB; Samu da	y delivery by ASL Sample		
Shipped to 325 PNL LAG	•			
Possible Sample Hazards <u>None Unclid</u>	inted with field instruments			
	<del>- )</del>	•		
11699-55-55-125/ 90-671	Sample Identification _	•		
1, peter, recar ejan gar	; soil; analysis of 2003	P-1 Garameters of		
D) 699-55-55-125A MINIST		Miceress		
1, 2 liter clear glass: sail, analysis of 2000-1 Parameter, of				
I Siterest				
At:				
	W			
	·			
	Chain of Possession			
· Pallanishadhan Add City	Received by: R.Z. Stelller	Date/Time:		
Relinguished by: JK Thompson	Received by:	10/19/90 1/30		
Relinquished by:	Received by:	Date/Time:		
N. J. Stath	1/10/1/m	10/19/90 12:35		
Relinquished by:	Received by:	Dage/Time:		
elinquished by:	Received by:	Date/Time:		

V (V	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST			
PART I: FIELD SECTION					
Collector W Company Con	·S· Thompson: R.Z.S.	2. Stefflik Date Sampled 10/19/90 Time 1047 hours Telephone (509) 373-3818 1047			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested		
699-55-5	T- 125				
1,2-	liter clur gass, so	il gnaly	Son 200-BP-1 farametersoz Gotterest (see statemento work)		
2 699-55-65	-/2.5A		- success the manager of		
	liter, clear glass, s	ut; andy	is 7 200-BPI Parametus of		
,					
			ļ		
· ———		<del>                                     </del>			
		W. A.			
<u></u>	<b></b>				
Field Informa	Field Information - all samples to be analysed for 200-BPI faramotors of Interest ( see statement types to be analysed for 200-BPI RI/ES).				
		0 0	and the second s		
Special Handle	ing and/or Storage <u>Same</u> y. No hayurdi cin.		h fuld instruments.		
	//	PART II: LABORATO	RY SECTION _ ,		
,	Paceived by MMM Title Map Stader Date 10/19/90				
T .alysis Requ	pired	<del></del>	•		

Indicate whether sample is soil, sludge, water, etc.

\*Use back of page for additional information relative to sample location.

,	Westinghouse Hanford Company	CHAIN OF	CUSTODY			
,	Company Contact W.S. Thompson/R.Z. Staffer Telephone (509) 373-31818  Sample Collected by W.S. Thompson/R.Z. Sledfier 10/19/190 Time 08/0,0645.  Sample Locations 699-52-57 Wellsite, Northof 200 EAST (200-621)					
	Remarks Oll Opposes to be analyzed for 200-BP-1 farameters of Deligion of Lading No. NA  Bill of Lading No. NA  Offsite Property No. NA					
	Method of Shipment hand Carry, Dameday to 325 DNL LAB (300 AREA)  Shipped to 325 PNL LAB.  Possible Sample Hazards NONE INDICATED BY FIELD INSTRUMENTS					
	1,2-liter, clear gars; soil,	Sample Identification	mtters of Interest			
D	1,500 nl., clear of att, water, 2nd HNOz, metals + Dadwchemicals farameters 3, 1-liter, amberday: unter 2nd HNOz, metals + Dadwchemicals farameters 3, 1-liter, amberday: unter 2nd Na OH; CN+ FreeCN 7, Interest					
Chain of Possession						
•	Relinquished by: W.S. Thompson Re Harely S. Thompson	R3 Stall	Date/Time: 10/19/90 0835 his.			
	R. 3 Stall	ceived by I	Date/Time: / 12.35			
		ceived by:	Dale/Time:			
	elinquished by: Re	ceived by:	Date/Time:			

Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST		
	•	PART I: FIELD SI	PART I: FIELD SECTION	
Collector W.S. Thompson R.Z. Company Contact W.S. Thompson			Date Sampled 10 19 90 Time 08/0 hours Telephone (509) 373 - 3818	
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	
,99-52-5	7-128 1, 2-liter, clear o	fass; soil;	analysis of Parameters of Interest	
<sub>e</sub> 99-52-57	1-125 1,500ml., clear of a 3, 1-liter, ander of 31 1-liter; ander	ss; water for ess; uxter; 20 egass; water;	LONDA-Trituim: 300-BP- & NAOH: CN+FreeCN: Parameter  Rmf HNOz: metals+radiochemicals) & Inter	
			JA.	
Special Hand	est Csee stateme	day deliv	Luged for 200-BP-1 Parameters of Lug- To 325 PNL Cab- (Keop Chilled) schuments.	
Paceived by	mallh.	PART II: LABORAT	vorif (20d) Date 10/19/40	

Indicate whether sample is soil, sludge, water, etc.
Use back of page for additional information relative to sample location.

	J.111 10 6-10 1521
Del i	vered by: Steffler Date/Time: 10/22/90 1530
Rece	eived by:
Cust	tomer Sample Number(s): <u>649-52-57-153</u> , 499-55-55-150
	Sample Number(s): 90-6714 90-6715
1,	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list):
3.	Reguest Abr Analysis Custody Seals on Shipping and/or Sample Containers and their Conditions
	Present Absent
	If Present, Condition: OOOP
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠.	Notes: NA
, <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	ICED PER Styfler) Condition of Sample Vials.
_	G00p
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.
	N/A

Westinghouse Hanford Company	. CHAIN OF	CUSTODY	
Company Contact. W.S. Thompson (Envir. Head Telephone (509) 373-3818  Sample Collected by W.S. Thompson Date 10/22/50 Time 1/50			
Sample Collected by W.S. Thom DSC	Date 10/23/5	7 Time 1150 ·	
Sample Locations 699-52-57 we	Usita: North of 2000	18 <i>T</i> )	
Ice Chest No. "Sleepy" poly	Pield Logbook and Pag	e No. WHC-N-287-2-pg.	
Remarks all samples to be			
	Jours J. Soil sam		
Bill of Lading No. NA	Offsite Property No. 🔏	<u>VA</u>	
Method of Shipment hand care	er in ASL Sample ware to	325 PNL Lab.	
Shipped to 325 PNL Lab (S		•	
Possible Sample Hazards 72 510 in a		crients	
	06	•	
A	Sample Identification	-	
1)699-52-57-153			
1,2-liter, cleargeas; soil;	2007P-1; analysis for to	rameters of Interest	
<del></del>	(see statem	en navel)	
	<u> </u>		
		. /	
/			
<del>-/</del>			
	Chain of Possession		
Relinguished by: puendy S. Thompson		Date/Time:	
1 1 1	Ro Attel	1	
	Received by	10/22/90 1230Ams. Date/Time: 10/22/90 15:30	
22 Hy/	MIIM	10/22/90 13:30	
Relinquished (1):	Received by:	Date/Time:	
1			
inquished by:		Date/Time:	
amquisica oy.	toutitud age	•	
1		l .	

<u> </u>	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST		
	PART I: FIELD SECTION				
	Collector W.S. Thompson R.E. Steffler Date Sampled 10/22/90 Time 1/50 hours Company Contact W.S. Thompson Telephone (509 1373-3818				
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested		
699-52-57	-153 : 1.2-Liter clea	rglass; soil;	analysis of 200-BP-1 Taraneters or		
		0	Indusis of 200-BRI Tarameters of Interest (see statement of work)		
			0		
		,			
		<u> </u>			
·					
}	<del> /-</del>	<del> </del>			
<del>                                     </del>	<del> </del>				
	<del> </del>				
	<del>                                     </del>				
	<del>{</del>				
	<del> </del>	<del> </del>			
1 ~ .	Field Information. All samples to be analyzed for 200-BP-1 Association				
Saterest (see statement ywork)					
Special Handling and/or Storage Samuel day delivery to 325 PNL LAB JOU					
	analysis. Keepon wetake until the receipt. Mo hazards				
Indicated with, field instruments  PART II: LABORATORY SECTION					
Peceived by					
.alysis Required					

Indicate whether sample is soil, sludge, water, etc.
"Use back of page for additional information relative to sample location."

Westinghouse Hanford CHAIN OF CUSTODY					
Company Contact. W. S. Thompson (Envir Fierd Services) Telephone (509) 373-3811					
Sample Collected by W.S. Thon	USBR 10/2	2/90 Time 1335 ·			
Sample Locations 699-55-55	welsite: North of 20	00 x 18 t			
	Ice Chest No. "Sleepy polycoples Field Logbook and Page No. LVHC-N-287-2 pg71.7				
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Remarks all samples tibe analyzed for 200-801 Parameters or Interes				
supporting RI/F. ( See statement & work)					
Bill of Lading No. NA Office Property No. NA					
Method of Shipment Wand C	Method of Shipment Wand carry in ASL Sample van wane day deliver				
Shipped to 325 PNL Lat (366 Area) . ().					
Possible Sample Hazards Nonce	indicated with fie	ld instruments.			
**	. Sample Identification				
699-55-55-150	•				
1, 2-liter : Clear glass :	Soil analysis 17 200-CH	2-1 Parameters of Interest			
1,2-liter; Clear glass; Soil; analysis of 200-BP-1 Parameters of Interest (see Statement 17 Work)					
10/0/					
90-6715					
	\				
Chain of Possession					
Relinquished by: W.S. Thompson Received by: p. R. 2. Steffler Date/Time:					
Hundy & Mompson	R. J. Stell	10/22/90 1405 hm			
Relinguished by: 1. 2 5/e///e-	Received by:	Date/Time:			
K. 3 Styll	116W 1/w	10/11/90 1530			
elinquished by	Received by:	Dáte/Time:			
1		•			
	Received by:	Date/Time:			
		•			

Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST		
PART I: FIELD SECTION				
Collector W.S. Thompson / R.Z. Steffler Dar Company Contact Wendy S. Thompson Tel			Date Sampled 10/22/90 time 1335 hours Telephone (509)373-3818	
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	
699-55-55	r =	Cear can.	rock: analysis of 200-8P-1 Hrameters	
			of Siteres (see statement gwork)	
			· /	
·				
<b></b>	•			
<del> </del>		<u> </u>		
,				
	<del></del>	<u> </u>		
Field Informa	tioner <u>All sample</u> eterest (see state		alynd for 200BP-1 Parameters  - ky for 200BP-1 RIFS.	
10 32	ling and/or Storage Rep 5 PNL Lab for a eld instruments	nalypis. Y	lo hazards indicated with	
	PART II: LABORATORY SECTION			
alysis Required Title Tout				

ndicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

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### Attachment 6

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 3

122111172

200-BP-1 SUMMARY TABLE
Laboratory: PNL-325
3DG #: Report 3; Rev 0

# PARAMETERS OF INTEREST - soil sample value/qualifier

Parameter	, DL	E33-38-006.2	E33-40-008
ANIONS (ppm)	=======================================	, ====================================	
nitrite nitrate phosphate	0.2 0.2 0.6	<0.2 0.6 <0.6	<0.2 0.9 <0.6
sulfate	3.7	6.3	15.0
CN (ppm)			
total free	0.1-0.4 N/A	<0.1 NR	<0.1 UJ NR
GFAA (ppb)			
Se Bi	1.3 4.3	<1.3 T	

NR not reported and/or requested

all sample numbers begin with 299- prefix

#### 200-BP-1 DATA QUALIFIER DEFINITIONS

- U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J The associated value is an estimated quantity.
- UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R The data are unusable.



#### OSM RCRA LEVEL C DATA ASSESSMENT

DATE 01/12/91  REVIEWED BY JA Lorch 1  LÄBORATORY PNL-325  CASE # TPP-16772  SDG # Report 3: Rev 0  Parameters of interest DAT	all some segina 290 pref:	mpla#6 <u>E3</u> With <u>E3</u>	33-40-008 3-38-006.7 >th =011	<u>.</u>					
QUALITY CONTROL CHECK	ANALYSIS	Anions	CN(total)	GFAA					
1. Holding times		_0_	_X_	0					
2. Matrix Spike		0	0	_M_					
3. Duplicate Analysis		0	0	0					
4. Method Blanks		0	0	0					
5. Calibrations/Control S	47	<u> </u>	0	0					
6. Other QC - See									
7. <u>Civar ac 12</u> 2	culecv.		<del></del>						
8.				<del></del>					
9.				<u> </u>					
		<del> · · · · · · · · · · · · · · · · ·</del>	-						
0 = data had no problems X = data qualified due to minor problems M = data qualified due to major problems/some data may be unusable									
overall assessment: <u>Se</u> , P	able in	recover Vqualifi	ication	<u></u>					
NOTES: <u>nono</u>	,								

 $\ensuremath{\text{o}}$  Refer to the corresponding attachments for explanation of any problems.

34 124104

RCRA LEVEL C QC Name JA Lerch AJ Date <u>01/12/91</u> QC Check: Holding times . comments: Anions - all holding time requirements met CN-holding time exceeded by 4 days on 299-E33-40-008 GFAA- all holding time requirements met ACTION: qualify associated routs as per OSM quidelines sample # constituent value/qual sample # constituent value/qual TU 1.0> 199-E33-40-008

\_/ of 6

#### RCRA LEVEL C QC

	Name 5	1 Lerch	11	Date	1/12/91
		Matri			
	COMMENTS:	Anions -			eries within acceptable 3 to 98% ronge)
	ČN-a	Il Recoverie			77 and 101%; no problems
					cries very low; Se analytica
	qual	ity ass.	ociated	1 -	esults as per
		sm gui			
-99·E33	* sample *	constituent Se. Bi	Value/qua	J .	sample # constituent value/qual GFAA -low spike recoveries appear to be result of interference
299-E33	:-38-006 :2		< IDL U		and lack of Zeeman Luckground correction

2 of 6

RCRA LEVEL C QC

Name JA Lerch Date 01/12/91

QC Check: Duplicate Analysis

COMMENTS: aNions - all RPD's less than 11.37. where applicable; no problems

CN - both sample + dup below detection limits; RPD N/A

GFAA - all duplicate RPD's Ok.

ACTION: none

sample # constituent value/qual | sample # constituent value/qual

3 of 6

#### RCRA LEVEL C QC

Name JA Lerch	Date	01/12/	<u>'91                                    </u>	
QC Check: Blank and		<u></u>		
CM-no contamina	ts defect	ed in	CN blank	<u></u>
ACTION: NONE	-			
sample # constituent	value/qual	sample #	constituent	value/qual

4 of 6

RCRA LEVEL C QC

Name TA Lerch Date 01/12/91
ac check: <u>Calibrations</u> /Control Std
comments: Animus-all std 72R between 93-10970; no problems CN-all LCS recoveries acceptable  BFLA-all calibration, control std 72R ok
ACTION: NONS
sample # constituent value/qual sample # constituent value/qual

5 of 6

RCRA LEVEL C OC

Name JA Lerch Date	01/12/91
QC Check: Other QC	
comments: ON- all results  no Free CN c	were kelow zppm -> malysis Required
ACTION: None	
sample # constituent value/qual	sample # constituent value/qual

<u>6</u> of <u>6</u>

#### INTRODUCTION -

(\*)

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analyses for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, and tritium. Weight percent solid was also determined for soil samples. All data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 14) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

#### CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B.m Dillessin

B. M. Gillespie 200-BP-1 Project Manager 7-90

Date

#### Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

JV L. Daniel

PNL ACL Quality Representative

Date

TABLE 1: 200-8P-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number	Sample Type
299-E33-40-008	90-7060	Soil
299-E33-38-006.2	90-7061	Soil

つ

### **INORGANIC DATA TABLES**

TABLE 2: WEIGHT PERCENT SOLIDS SUMMARY SHEET

SAMPLE ID#	PNL LOG#	SAMPLE WT %	DUPLICATE WT %	AVERAGE SOLIDS WT %
			~~~~~~~	~~~~~~~~
299-E33-40-008	90-7060	93.86	93.52	93.69
299-E33-38-006.2	90-7061	96.96	96.74	96.85

<sup>\*</sup> Weight Percent Solids were determined following the method outlined in PNL-ALO-504.

#### ANION ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. The sample solution was then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis was performed in building 325 in the 300 area.

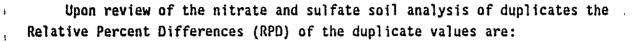
The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte. Data results are reported as dry weight (i.e. converted from weight % solids).

The mean % spike recoveries (sample + spike, matrix duplicate spike and blank + spike) and their standard deviation (SD) for this set of data are as follows:

	REC :	<u>+ SD (%)</u>
N02-N	96.3	1.9
NO3-N	94.1	3.1
P04-P	83.6	3.6
S04	84.1	11.2

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NO3-N 10.9 SO4 11.3

The values varied due to heterogeneity of sample matrix. The concentration of the other soil analytes was below the detection limits, therefore a RPD is not calculated.

The requested hold time maximum for water analysis of anions is 48 hours from sampling to the time of analysis. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

WITRITE (WOZ-W)

#### SOLID SAMPLES

							3	•••••			% RECOVERIE	S
-		C1 Sample	CZ SAMPLE DUP		ĆŠ Blank	SPIKE+SAMPLE ANALYSIS	SP1KE ACTUAL	DUP+SPIKE ANALYSIS	SPIKE SPIKE	C3 SAMPLE +	C6 DUP+	E4 Blank+
SAMPLE ID#	PNL LOG#	(mg/Kg)	(mg/Kg)	RPD	(n8)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SPIKE
299-E33-38-006.2 299-E33-40-008	90-7060 90-7061	<0.2 <0.2	<0.2 <0.2	NA NA	<0.2	21.3	21.7	20.6	21.8	98.2	94.5	96.1

Detection Limit = 0.2 mg/Kg

Whote: RPD (relative percent difference) only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 102.2% and 98.3%, respectively.

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#### TABLE 3: ANION IC ANALYSIS DATA

NITRATE (HO3-H)

SOLID SAMPLES

								••••••	6	****** * RECOVERIES***********************************		
		C1 SAMPLE	C2 SAMPLE DUP		C5 Blank	SPIKE+SAMPLE ARALYSIS	SPIKE ACTUAL	DUP+SPIKE ANALYSIS	SPIKE ACTUAL	C3 SAMPLE +	C6 DUP+	C4 Blank+
SAMPLE 10#	PWL LDG#	(mg/Kg)	(mg/Kg)	RPD	(gu) .	(øg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SPIKE
299-E33-38-006.2 299-E33-40-008	90-7060 90-7061	0.6 0.9	<0.2 1.0	#A 10.9	<0.2	16.0	16.1	15.7	16.2	93.7	91.2	97.3

Detection Limit = 0.2 mg/Kg

Note: RPD only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 96.3% and 93.7%, respectively.

1122 10139

TABLE 3: ANION IC ANALYSIS DATA

#### PHOSPHATE (PO4-P)

SOLID SAMPLES

						C	3		6		% RECOVERIE	S
		£1	£2		C5	SPIKE+SAMPLE		DUP+SPIKE	SPIKE	C3	<b>C6</b>	C4
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPD	BLANK	ANALYSIS	ACTUAL	ANALYSIS	ACTUAL	SAMPLE +	DUP+ Spike	Blank+ Spike
*****************	*******	******	*******	*******	(ug)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	3/1KE	911KE
299-E33-38-005.2	90-7060	<0.6	<0.6	NA								
299-£33-40-008	90-7061	<0.6	<0.6	NA	<0.6	18.8	23.3	19.2	23.3	80.7	82.4	87.7

Detection Limit = 0.6 mg/Kg

Note: RPD only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 92.0% and 94.3%, respectively.

#### TABLE 3: ANION IC ANALYSIS DATA

#### SULFATE (SO4)

SOLID SAMPLES

										X RECOVERIES		S
		C1	C2		<b>C</b> 5	SPIKE+SAMPLE	SPIKE	DUP+5P1KE	SPIKE	£3	<b>C6</b>	64
		SAMPLE	SAMPLE DUP		BLANK	AHALYSIS	ACTUAL	AKALYSIS	ACTUAL	SAMPLE +	DUP+	BLANK+
SAMPLE 10#	PNL LOS#	(mg/Kg)	(mg/Kg)	RPD	(gu)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SPIKE
	*******	*****	********	******	*******					*******	*******	
299-E33-38-DD6.2	90-7060	6.3	<3.7	HA								
299-E33-40-008	90-7061	15.0	16.8	11.3	<3.7	71.7	71.3	70.9	71.5	78.3	76.9	97.0

Detection Limit = 3.7 mg/Kg

Note: RPD only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 80.7% and 79.3%, respectively.

#### CYANIDE ANALYSIS RESULTS

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The samples and their accompanying QC samples were prepared by procedure PNL-ALO-270, Total Cyanide in Waters, Solids or Sludges. The methodology is comparable to CLP SOW 788 Method 335.2 distillation and colorimetric technique for the analysis of cyanide. The analysis was performed in building 3720 in the 300 area.

The procedure, PNL-ALO-270, did not reflect the correct CLP standard preparation guidelines (section 7.3.2.1 and 7.4.2.1). The analysts made a deviation to the procedure and used the client requested method, CLP SOW (788), method 335.2, for the standard preparation (page D-76). An Interim Change Notice (ICN) to the procedure is in the process of being written.

The sample results were below the client required detection limits of 10 l mg/Kg. Sample results are all below 2 ppm; therefore free cyanide analysis was not required.

Upon review of the sample spiked data results, the mean recovery is 97.0% with a standard deviation of 0.4%. The mean recovery of the Laboratory Control Standard is 90.5% with a standard deviation of 2.3%.

The general Environmental Protection Agency (EPA) hold time for total cyanide is 12 days. The hold time was inadvertently not met for one of the samples but was met for the other. There is no known impact on the results of the late analysis date as the cyanide concentrations are below the detection limits, and samples are preserved in basic media. The LCS standards were acquired from EPA in April of 1990 (six months prior to analysis) and are in basic media and produce satisfactory recoveries (mean of 97%); therefore the late analyses of the sample is unlikely to have any impact on the results.

#### TABLE 4: TOTAL CYANIDE ANALYSIS DATA

SOLID SAMPLES

										•••••	X RECOVERIE	.5
		Gî	62		<b>G</b> 5		3		6	<b>c3</b>	Cé	
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPD	BLANK (Ug)	SPIKE+SAMPLE (mg/Kg)	(mg/Kg)	DUP SPIKE (mg/Kg)	SPIKE (mg/Kg)	Sample 4 Spike	SPIKE	LCS SAMPLE
	90-7060 (	e) <0.1 <sup>0</sup>	uJ <0.1 <0.1	NA NA	0.1 <0.1	9.66 9.69	9.62 9.96	9.66	9.61	100.5 97.2	92.8	94.4 92.1

Detection limits for soil = 0.1-0.4 mg/Kg (theoretical)

(a) Hold time missed by 6 days.

2

01/12/91

#### FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 ppm, therefore free cyanide analysis was not performed on the samples in this set.

# <u>Table 5</u>: Free Cyanide Analysis Data No data necessary.

#### GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

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Samples and their accompanying QC samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestates were then analyzed by graphite furnace atomic absorption (GFAAS) following procedure PNL-ALO-215, Selenium (Atomic Absorption, Furnace Method), for selenium and PNL-ALO-216, Bismuth (Atomic Absorption, Furnace Technique), for bismuth. Se and Bi analysis methodologies are consistent with CLP SOW 788 Method 270.2. Digestion of samples and analysis by GFAAS was conducted in building 325.

Analysis for Se and Bi was conducted on a Perkin-Elmer 5100/HGA 600 (not equipped with a Zeeman background correction device). The quarterly instrument detection limit (IDL) for Se was found to be 1.3  $\mu$ g/L. The corresponding IDL for Bi was found to be 4.3  $\mu$ g/L.

A preliminary analysis of the samples was performed to determine the dilution factor necessary to bring the concentration to mid-range in the calibration curve. All sample solutions were determined to have Se and Bi levels below the respective detection limits 3.25  $\mu$ g/L and 10.75  $\mu$ g/L. Detection limit was defined as 2.5 times the IDL.

The data are reported in Table 6 for selenium results and Table 7 for bismuth results. Each table has a summary results table followed by a batch results table for easy verification of control standards and quality control samples analyzed per batch.

Upon review of the data tables for selenium (Table 6A) and bismuth (Table 7A), the average recovery of selenium spike is 79.6% with a standard deviation of 33.5% (for samples with recoveries above 0%), the average recovery of bismuth spike is 89.9% with a standard deviation of 9.3% (for samples with recoveries above 5%). A precision determined from the duplicate sample analysis is not possible since the results are below detection limits.

The large bias and poor precision associated with the analysis of selenium in soil samples is attributed to the low concentrations of selenium and spike standard in the samples and matrix interference (of iron) in the

determination in selenium analysis. A Zeeman background correction attachment is necessary for this matrix correction. The data in Tables 6 and 7 are flagged with appropriate CLP (as defined in CLP SOW 7/88, pages B-19 and 20) flags where necessary. ICB, CCB, ICV, CRA, etc. are as defined in the CLP SOW 7/88, section E.

The CLP SOW 788 specified hold time of 180 days was met as well as the contract required hold time of 120 days.

TABLE 6: SELENIUM ANALYSIS DATA

#### ACID EXTRACTABLE SELENIUM IN SAMPLES

#### SOLID SAMPLES

									•			•••••	X RECOVERIE	\$
		81		82			85	B	3	B	6	<b>B</b> 3	96	84
SAMPLE ID#	PNL LDG# (	SAMPLE a)(Ug/L)	Spike % Rec	SAMPLE DUP (Ug/L)	Spike % Rec	RPD (c)	(nB/F)	SPIKE+SAHPLE (UD/L)	\$PIKE (ug/L) (b)	BLANK+SPIKE (Ug/L)	SPIKE (ug/L) (b)	SAMPLE +	BLANK+ SPIKE	LCS SAMPLE
699-55-55-050 699-55-55-050 299-E33-40-008 299-E33-40-008 299-E33-38-006.2 299-E33-38-006.2		<1.3 4.8 <1.3 3.5 <1.3 3.2	67	<1.3 4.4	116	8.7	<1.3 11.0	<1.3 6.8	25.00 10	<1.3 7.3	25 10	0 122	0 123	106

Instrument Detection Limit (IDL) for soil in solution = 1.3 ug/L = 0.1 mg/Kg (calculated using average sample size of 1.5 g) Method Detection Limit (DL) for soils in solution = IDL x 2.5 = 3.25 ug/L = 0.22 mg/Kg (calculated using average sample size of 1.5 g) Contract Required Detection Limit (CRDL) = 0.5 ug/g (0.5 mg/Kg)

(a) Analytical Spike (AS) = 10 ug/L

(b) Pre-digest spike = 25 ug/l for 63, 84 and 66
 (c) RPD only calculated if both sample and duplicate are greater than detection limit.

TABLE 7: BISHUTH ANALYSIS DATA

ACID EXTRACTABLE BISHUTH IN SAMPLES

#### SOLID SAMPLES

												******	X RECOVERIE	S	
		Bi		82			B5	B	3	*****	6	83	B6	B4	
		SAMPLE	Spi ke	SAMPLE DUP	Spike		BLANK	SPIKE+SAMPLE	SPIKE	BLANK+SPIKE	SPIKE	SAMPLE +	BLANK+	LCS (d)	
SAMPLE 10#	PHL LOG# (1	)(ug/L)	% Rec	(ug/L)	X Rec	RPD (c)	(ug/L)	(Ug/L)	(Ug/L) (b)	(ug/L)	(ug/L) (b)	SPIKE	SPIKE	SAMPLE	
******		*****	••••	•••••			••••			•••••	••••••	******	******	******	
699-55-55-05D	90-5356	<4.3		<4.3			<4.3	⋖.3	50	<4.3	50	4	4	89 .	
699-55-55-050	90-5356-AS	18	87	13.5	65	28.6		21.2	20	16.9	20	96	74		
299-E33-40-008	90-7060	<4.3 L	AT .												
299-E33-40-D08	90-7060	17.4	86												
299-E33-38-006.2	90-7061	<4.3 L	な												
299-E33-38-DD6.2	90-7061	17.2	87												

Instrument Detection Limit (IDL) for soil in solution = 4.3 ug/L = 0.3 mg/kg (calculated using average sample size of 1.5 g) Method Detection Limit (DL) for soils in solution = 1DL x 2.5 = 10.75 ug/L = 0.72 mg/Kg (calculated using average sample size of 1.5 g) Contract Required Detection Limit (CRDL) = 10 ug/g (10 mg/Kg)

<sup>(</sup>a) Analytical Spike (AS) = 20 ug/L

<sup>(</sup>b) Pre-digest spike = 50 ug/i
(c) RPD only calculated if both sample and duplicate are greater than detection limit.

<sup>(</sup>d) B4 = 1CS-0287 + 40 ug Bi spike

### 200-BP-1 GROUNDWATER ANALYSIS PROJECT

# PARAMETERS OF INTEREST DATA PACKAGE/REPORT No. 3 Revision 0

APPENDIX B
CHAIN OF CUSTODY

#### 200-BP-1 GROUNDWATER ANALYSIS PROJECT

## PARAMETERS OF INTEREST DATA PACKAGE/REPORT No. 3

#### Appendix B

#### TABLE OF CONTENTS

#### Appendix B - Chain of Custody

B1 - Westinghouse Chain of Custody and Sample Analysis Request Forms

B2 - PNL Chain of Custody Forms

# B1 - WESTINGHOUSE CHAIN OF CUSTODY, SAMPLE ANALYSIS REQUEST FORMS AND PNL SAMPLE RECEIPT FORMS

#### SAMPLE RECEIPT FORM

	ivered by: Steffle Date/Time: 11/12/40 14:47
Deli	ivered by:
	eived by: MC
Cust	tomer Sample Number(s): <u>299-E33-40-008</u>
ALO	Sample Number(s): 98 - 7060
1.	Customer Chain-of-Custody Form: Present / Absent
2.	Additional Shipping forms (list):
•	RSR Reduced for Analysis Custody Seals on Shipping and/or Sample Containers and their Conditions
3.	
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠.	Nates: N//
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). $I.CEID$
6.	Condition of Sample Vials.
7.	Verification of Agreement or Honagreement of Information on Receiving Documents.
8.	April  Resolution of Problems or Discrepancies.
<b>J</b> •	Min

RETURN COMPLETED FORM TO PROJECT HANAGER

B01-002

Part.	Westinghouse Hanford Company		CHAIN	OF CUSTODY							
進	ompany Contact. W.S. THON	1P509	Tele	nhone <u>: 373 - 38</u>	18						
- 12	mple Collected by W.S. THOMP	ON /2.2. STEER									
2	Sample Locations 299-633-40										
ς.	Ice Chest No Cosulon #4 Field Logbook and Page No. WHC-N-287-2- pg&c										
1	Remarks SAMPLE TO BE ANALYZED FOR 200-BAI DARAMETERS OF INTEREST										
ě,	(SEE STATEMENT DE WORK)										
): 1.	Bill of Lading No. N/A Offsite Property No. N/A										
	Method of Shipment HAND CAPR	I IN ASL S	AMPLE VAN								
	Shipped to 325 PNL LAG	(300 AREA)	•		•						
	Possible Sample Hazards 71 on e in		Lued inst	11 men Fr							
		01	/	• .							
		Sample ide	ntification		•						
> ;	199-E33-40-008	. 0									
• [	1,2-liter, clear glass	jacet ; Taram	tuby Dita	1 (200DP-1)	 						
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,											
,	**	Chain of P	ossession .	<del></del>							
	Relinquished by: W.S. THOMPSON	Received by: R-	Stelller	Date/Time:							
	Il & Shompson	12 St	//	11/12/90	1351						
	Relinquished by:	Received by:	<u> </u>	Date/Fime;							
	Ro Styl	11/1/1/1/1/		11/12/90	14.47						
	Polipouished by:	Received by:	·	Date/Time:							
			•		į						
4	quished by:	Received by: .	<del></del>	Date/Time:							
			14003								

(V	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST					
		PART I: FIELD SE	CTION				
, t	S. THOMPSON/RZ.	STEPPLER	Date Sampled 11/12/90 Time 1315 hours Telephone (509) 373-3818				
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested				
299-E33-	40-008		·				
1	2-Liter Menrolass. De	i. Paranut	so of Interest - (00-BPI) see statement				
			2 mork				
		·					
<del></del>							
) <u></u>							
*********		الكالي المالي	<u> </u>				
)		<u> </u>					
	<u></u>						
		<del></del>					
	/						
-SEE ST	ATELLENT OF WORK.  No hazardo in ing and/or Storage Leip (	1	FOR SEC-BPI PAKAMETERS OF INTEREST field instruments vetrce until receipt at				
Hope.		PART II: LABORATO	ORY SECTION /				

Indicate whether sample is soil, sludge, water, etc.

BO1-004

A-6000-406 (07/89)

#### SAMPLE RECEIPT FORM

Deli	vered by: R. STOFFLER Date/Time: 11/6/90
Rece	eived by: R. STOFFLER Date/Time: 11/16/90
Cust	tomer Sample Number(s): 299-F33-38-006.2
Vro	Sample Number(s): 90-7061
1.	Customer Chain-of-Custody form: PresentAbsent
2.	Additional Shipping Forms (list):
٠.	COC
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
<b>-</b>	-Present Absent
	If Present, Condition: OK
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
••	Notes: N/A
. <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). AT RCFRIC TEMP
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.
	N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford Company		, CHAIN C	F CUSTODY	
ompany Contact S.E. ICOS		Teleph	ane <u>· 3</u> 7:	3-3381
Tample Collected by R. STEFFLER	S. Kas			
Sample Locations 299-E33-38				
Ice Chest No. EPSILON #3				
Remarks SAMPLE TO BE	ANALY25	O FOR: 200-BP-	PARAME	TERS OF
INTEREST (SEE STATE				
Bill of Lading No. NA				
Method of Shipment HAND CARE	Y 70 37.5	PNL LAB IN AS	L SAMPL	EUAN
Shipped to 325 PNL				•
Possible Sample Hazards NONE   DI			NSTRUM	ENTS
			•	
13 no. con : no. no. n	•	e Identification		*
1) 299-E33-38-006.2		<del>-</del>	<del></del>	•
2 LITER CLEAR GLAS	5,501L; A	walysis of 700	-BP-1 PAR	ametres of
	<del></del> _	_	<del></del>	<u>luterest</u>
	<del></del>	<del>-</del>	<del></del>	
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		•		
	<del></del>	of Passessian A' 2 Shiffler	· · · · · · · · · · · · · · · · · · ·	
Relinquished by: S.E. KOS	Received by:	11 35	Date/Time:	
Delinarish of the	7) 4	CAC	11/16/90	1200
Relinquished by:	Received by:		Date/Time:	1336.
M.S. Slille	Minnis	Rekling	11/16/90	1:30
ished by:	Received by:		Date/Time:	
		•		
inquished by:	Received by:	B01÷006	Date/Time:	
		POT A OUG		* 1

Q.	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST						
	PART I: FIELD SECTION								
	STEFFLER_/S.KOS tactS.KOS		Date Sampled 11/16/90 Time 1103 hours Telephone (S09) 373-338						
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested						
1) 299-E3	3-38-006.2								
	1, 2 LITER, CLEAR	GLASS, SOIL	ANALYSIS OF ZOO-BP-1 PARAMETERS OF INTEREST						
		· · · · · · · · · · · · · · · · · · ·	OF INTEREST						
· 									
·									
<del></del>									
	<u> </u>	NXA	<u> </u>						
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	1	<del> </del>							
Field Informa	tion** SAMPLES TO								
		OF INTERE	ST ( SEE STATEMENT						
	OF WORK)	<del> </del>							
Special Handl	ling and/or Storage <u>NO HA</u>	ZAROS IN	DICATISO WITH						
	- FIELD	INSTRUM	BNTS						
		C207 + 2002 ATC							
	- 220 =	PART II: LABORATO							
•		Title Som	ver research and pare 11/16/70						
sis Requ	iired	·							

indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

B01-007

A-6000-406 (07/89)

#### Attachment 7

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 4



54 7910 046

#### OSM RCRA LEVEL C DATA ASSESSMENT

DATE 02/24/91			E33-40-201.7	<u>Sai</u>						
REVIEWED BY JA Lerch	all Son begin	aple #'s	E33-40-201.7A	<u> انمع</u>						
LABORATORY PNL-525	299 -	<b>prefix</b>	E33-40-200	water						
CASE # TPP 14772			E33-40-201	water						
SDG # Report 4; Rev O Parameters of interest			E33-40-201A	wester						
	ASSESSMEN	T SUMMARY	Ĺ							
QUALITY CONTROL CHECK	ANALYSIS	Anions	cu (total)	GFAA Metals						
1. Holding time			_×_	<u> </u>						
2. <u>Matrix Spike</u>			_0_							
3. Duplicate Analysis		<u>X</u>	0	0						
4. Blanks		0	_0_	_0_						
5. calibration/control Std		0	<u> </u>	0_						
6. other ac see	attach	ment								
7.										
8.										
9.										
10.										
<pre>0 = data had no problems X = data qualified due to minor problems M = data qualified due to major problems/some data may be unusable</pre>										
OVERALL ASSESSSMENT: Sec	sults.	for soi	1 unusable o	lue to						
low spike recoveries	; all o	ther	results acc	eptable						
with qualifiers		<del></del>								
NOTES: none										

o Refer to the corresponding attachments for explanation of any problems.

Name JA Lerch	£ Date	02/25/	a <u>ı</u>	
QC Check: Holding	Time	<del></del>		
COMMENTS: Anions - c	11 holding t	ime req	uirements	met
Total CN - holding				
	er hadding t			
GF40 metals - a				
ACTION: qualify	associated	result	s as por	
OSM qu	i delines			·
·				<del></del>
sample # constituent 3-40-201.7 CN		<u>sample #</u>	<u>constituent</u>	value/qual
		•		
••				
,				

<u>/</u> of <u>6</u>

Name :	JA Lerch	Dat	e <u>02/25/</u>	۹۱		
	eck: Matc					
CN - GFAA al	metals - So other Se 3: Bi - Spi	- all spike recoversible 7.72 for soil + water 2 ke 7.8 for so	rier acc r soils 0 b2 + AS oils low,	eptable (attributed 7.72 withing AS ZOR	to interference	;e)
		ZZ result				
Action: a	quality as	ociated resu	Hrar per	osm qui	delines	
sampli all soil all soil	Bi	t value/qual < 1 UJ < 5 R		<u>constituent</u>	<u>value/qual</u>	
•						

2 of 6

Name JA Lerch Date 02/25/91	
QC Check: Blanks	
comments: <u>all anion</u> , CN, and GFAA blanks free of contamination	
ACTION: nene	
<pre>sample # constituent value/qual sample # constituent value/qual</pre>	
4 of 6	_

Name <u>JA Larch</u> Jate <u>02/25/95</u>	
QC Check: Calibration / Control Samples	
COMMENTS: Anions - all std recoveries ok	
CN- all LCS recoveries of colibration curves ok	
CFAA-all initial + continuing cal. std recoveries ok, LCS recoveri	es
OK; Rull Log Sequence ok	
ACTION: none	
sample # constituent value/qual sample # constituent value/qual	
,	

<u>5</u> of <u>G</u>

Name JA Lerch Date	02/25/91
QC Check: other QC	
comments: <u>all CN results</u> < ferroch required	DL - no free CN or
ACTION:	
sample # constituent value/qual	sample # constituent value/qual
3	

6 of 6

TABLE 1: 200-8P-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number	<u>Sample Type</u>
299-E33-40-201.7	90-7062	Soil
299-E33-40-201.7A	90-7063	Soil
299-E33-40-200	90-7064	Water
299-E33-40-201	90-7065	Water
299-E33-40-201A	90-7066	Water

#### **INTRODUCTION**

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, and tritium. Weight percent solid was also determined for soil samples. All data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 15) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

#### **CERTIFICATION STATEMENT**

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPjP ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

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<u>70°</u>	<i>Y</i> /(	Liller	<i>~~</i>	
				_

B. M. Gillespie

200-BP-1 Project Manager

### Quality Control

I certify that I have reviewed all data in this report/package for . completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

PNL ACL Quality Representative

#### ANION ANALYSIS RESULTS

CO

The soil samples and their accompanying QC samples are prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. These soil leach solutions and water samples are then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis is performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte. Soil data results are reported on a dry weight basis (i.e, corrected for weight % solids).

The mean % spike recoveries (sample + spike, matrix duplicate spike and blank + spike) and their standard deviation (SD) for this set of data (including both soil and water samples) are as follows:

•	REC	± SD	_ (%)
N02-N	104.1	4.0	
N03-N	99.1	2.8	
P04-P	88.2	6.7	
S04	99.9	2.1	

Upon review of the NO3-N and SO4 soil and water analysis, the mean RPDs of the duplicate values (those above the detection limit) are:

<u>RPD</u>

NO3-N 3.2

S04 20.7

The values varied due to heterogeneity of soil samples and the variations between sample matrices. The concentration of the other analytes was below the detection limits, therefore a relative percent difference is not calculated.

The hold times for water analysis of anions is 48 hours from sampling to the time of analysis. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

NITRITE (NO2-N)

SOLID SAMPLES

----- % RECOVERIES-----**C3** C4 C1 CZ C5 63 DUP+ BLANK+ SAMPLE SAMPLE DUP BLANK SPIKE+SAMPLE SPIKE DUP+SPIKE SPIKE SAMPLE + SPIKE SPIKE SPIKE RPD (mg/Kg) (mg/Kg) (mg/Kg) (mg/Kg) SAMPLE 1D# PNL LOG# (mg/Kg) (mg/Kg) (mg/kg) <2.0 <2.0 A/H <2.0 198.0 200.0 209.0 212.0 99.0 98.6 100.0 299-E33-40-201.7 90-7062 236.0 228.0 103.5 299-E33-40-201.7a 90-7063 <2.0 <2.0 N/A 100.4 (C3 and C6) mean 2.7 std. dev. DL = Detection limit of 2.0 mg/Kg

CD assumes average C1-C2 sample weight for mg/kg equivalent

WATER SAMPLES

----- % RECOVERIES-----C1 C2 C5 **C3** C6 C4 BLANK+ SAMPLE SAMPLE DUP BLANK SPIKE+SAMPLE SPIKE DUP+SPIKE SPIKE SAMPLE + DUP+ SPIKE SPIKE SPIKE (ug/L) (U9/L) (Ug/L) (ug/L) SAMPLE 1D# PNL LOG# (ug/L) (ug/L) RPD (ug/L) 1650 1520 1620 1520 108.6 106.6 107.9 90-7064 <14.9 <14.9 N/A <14.9 299-E33-40-200 1620-1520 106.6 299-E33-40-201 90-7065 <14.9 <14.9 N/A 1520 106.6 299-E33-40-201a 90-7066 <14.9 <14.9 N/A 1670 107.1 (C3 and C6) DL = Detection Limit of 14.9 ug/L mean std. dev. 1.0

Note: RPD only calculated when both sample and duplicate results are >DL.

NITRATE (NO3-N)

SOLID SAMPLES

											% RECOVERIE	S
		C1	C2		<b>C</b> 5	C	3	(	%	C3	C6	C4
		SAMPLE	SAMPLE DUP		BLANK	SPIKE+SAMPLE	SPIKE	DUP+SPIKE	SPIKE	SAMPLE +	DUP+	BLANK+
SAMPLE ID#	PHL LOG#	(mg/Kg)	(mg/Kg)	RPD	(mg/kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SPIKE
	*******	*****		•••••		**********					*******	*******
299-E33-40-201.7	90-7062	8.2	8.4	2.7	<2.0	150.0	148.0	161.0	158.0	95.6	96.5	98.2
299-E33-40-201.7a	90-7063	7.8	8.4	6.8	<2.0	169.0	169.0			95.2		
									nean	95.8	(C3 and C6	)
DL = Detection lia	nit of 2.0 r	ng/Kg							std. dev.	0.7	•	
C5 assumes average	c1-C2 samp	ole weight	for mg/kg e	quivalent								

WATER SAMPLES

-------

								•		*******	% RECOVERIES	
		C1	C2		C5	C	3		6	€3	66	€4
SAMPLE ID#	PNL LOG#	SAMPLE (ug/L)	SAMPLE DUP (ug/L)	RPD	BLANK (ug/L)	SPIKE+SAMPLE (Ug/L)	SPIKE (ug/L)	DUP+SP1KE (ug/L)	(ug/L)	SAMPLE + SPIKE	DUP+	BLAHK+ SPIKE
299-E33-40-200	90-7064	27.1	27.1	0.0	<14.9	1150	1130	1160	1130	99.4	100.3	101.8
299-E33-40-201	90-7065	<14.9	<14.9	N/A		1160	1130		,,,,,	102.7		
299-E33-40-201a	90-7066	<14.9	<14.9	N/A		1150	1130			101.8		
										*******	******	
DL = Detection Lin	nit of 14.9	ug/L							mean	101.1	(C3 and C6)	+
									std. dev.	1.5		

Note: RPD only calculated when both sample and duplicate results are >DL.

70

PHOSPHATE (PO4-P)

SOLID SAMPLES

		-				*				• • • • • • • • • • • • • • • • • • • •	* RECOVERIES	
		C1	C2		C5	C	<b>;</b>		:6	C3	C6	C4
		SAMPLE	SAMPLE DUP		BLANK	SPIKE+SAMPLE	SPIKE	DUP+SPIKE	SPIKE	SAMPLE +	DUP+	BLANK+
SAMPLE ID#	PHL LOG#	(mg/Kg)	(mg/Kg)	RPD	(mg/kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	SPIKE	SPIKE	SPIKE
				********								
299-E33-40-201.7	90-7062	<6.0	<6.0	N/A	<6.0	170.0	214.0	187.0	227.0	79.4	82.4	85.9
299-E33-40-201.7a	90-7063	<6.0	<6.0	N/A		193.0	244.0			79.1		
		•							mean	80.3	(C3 and C6)	
DL = Detection lin	nit of 6.0 m	ng/Kg							std. dev.	1.8		
C5 assumes average	: C1-C2 samp	ole weight	for mg/kg e	quivalent								
WATER SAMPLES												

		C1	C2		C5		<b>}</b>		:6	c3	% RECOVERIES	C4
SAMPLE ID#	PWL LOG#	SAMPLE (Ug/L)	SAMPLE DUP (Ug/L)	RPD	BLANK (ug/L)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	SAMPLE + SPIKE	DUP+ SPIKE	BLAHK+ SPIKE
200 577 /0 200	00 70//							**********				
299-E33-40-200	90-7064	<60	<60	N/A	<68	1500	1630	1600	1630	92.0	98.2	92.6
299-E33-40-201	90-7065	<60	<60	N/A		1510	1630			92.6		
299-E33-40-201a	90-7066	<60	<60	N/A		1490	1630			91.4		
DL = Detection Lin	.i+ o+ 40 0	/1								07.4	467 4 669	
Dr - perection file	111 01 00.0	Ug/L							mean	93.6	(C3 and C6)	•
									stď. dev.	3.1		

Note: RPD only calculated when both sample and duplicate results are >DL.

1

SULFATE (SO4)

SOLID SAMPLES

----- % RECOVERIES-----**C3** C6 C4 C5 C1 C2 BLANK+ SAMPLE + DUP+ DUP+SP1KE SPIKE SAMPLE SAMPLE DUP BLANK SPIKE+SAMPLE SP1KE SPIKE SPIKE SPIKE (mg/Kg) (mg/Kg) (mg/Kg) SAMPLE ID# PNL LOG# (mg/Kg) (mg/Kg)RPD (mg/kg)(mg/Kg) 93.3 96.1 101.4 707.0 657.0 764.0 697.0 89.4 9.6 <34 299-E33-40-201.7 90-7062 98.4 97.4 105 31.7 820.0 749.0 299-E33-40-201.7a 90-7063 76.3 🎜 95.6 (C3 and C6) mean std. dev. 2.1 DL = Detection limit of 34 mg/Kg

C5 assumes average C1-C2 sample weight for mg/kg equivalent

WATER SAMPLES

2

----- % RECOVER1ES-----**C3 C6** C4 C5 ------C1 C5 BLANK+ SAMPLE + DUP+ SPIKE SPIKE+SAMPLE SPIKE DUP+SPIKE SAMPLE SAMPLE DUP BLANK SPIKE SPIKE (Ug/L) (ug/L) (Ug/L) (Ug/L) SPIKE SAMPLE ID# PHL LOG# (Ug/L)(ug/L) RPD (Ug/L) 102.2 101.4 101.6 5080 5000 <250 H/A <250 5070 5000 299-E33-40-200 90-7064 <250 99.4 90-7065 <250 <250 R/A 4970 5000 299-E33-40-201 100.6 5030 5000 <250 299-E33-40-201a 90-7066 <250 N/A 100.8 (C3 and C6) mean DL = Detection Limit of 250 ug/L 1.0 std. dev.

Hote: RPD only calculated when both sample and duplicate results are >DL.

12/25/91

#### CYANIDE ANALYSIS RESULTS

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Samples and their QC samples were analyzed by procedure PNL-ALO-270 "Total Cyanide in Waters, Solids or Sludges". The procedure, PNL-ALO-270 has been rewritten to reflect the correct CLP standard preparation guidelines used in Parameters of Interest Data/Reports No. 1 - No. 3. Methodology is comparable to CLP SOW 788, Method 335.2, distillation and colorimetric technique for the analysis of cyanide. Analysis was performed in building 3720 in the Hanford Site 300 area.

The sample results were below the CRDL of 10  $\mu g/L$  in water and 1 mg/Kg for solids. Free cyanide analysis was not required as all samples had concentrations of cyanide of less than 2 mg/Kg. In all cases the 12 day hold time specified for cyanide analysis under the CLP protocol was met.

Average spiked sample cyanide recovery was 98.4% with a standard deviation of 4.9%. Recovery of cyanide for laboratory control samples was 104.2% for soil standard LCS-0689 and 106.5% for liquid standard ICV-6.

Cumulative QA data on laboratory control samples for data packages 1-4 are summarized in Table 1 in appendix C, page CO5-OO2. All laboratory control sample values were well within the 25% accuracy limits, with LCS-O689 and ICV-6 average recoveries of 98.0 and 103.3%, respectively.

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TABLE 4: TOTAL CYANIDE ANALYSIS DATA

#### SOLID SAMPLES

											% recovery	******
						(	63	********	<u> </u>	63	G6	64
Sample ID#	PNL Log#	G1 Sample (mg/Kg)	G2 Sample dup. (mg/Kg)	ZRPD	G5 Blank (mg/kg)	Sample+ spike (mg/Kg)	Spike (mg/Kg)	Dup.+spike (mg/Kg)	Spike (mg/Kg)	Sample+ spike	Dup.+ spike	LCS sample
299-E33-40-201.7	90-7062	<1.0 W	r <1.0	N/A	<1.0	9.07	9.27	9.1	9.26	97.9	98.2	194.1
299-E33-40-201.7A	90-7063	<1.0	<1.0	N/A	<1.0	9.16	10.19	9.3	10.22	89.9	91.0	104.2
G5 assumes averag	e sample wei	ight for mg/	kg equivalent			•			mean Std. Dev.	93.9 5.7	94.6 5.1	104.2 0.1
			11	1								

WATER SAMPLES

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								3		36	63	G6	G4
	Sample 10#	PNL Log#	G1 Sample (Ug/L)	G2 Sample dup. (ug/L)	<b>XRPD</b>	G5 Blank (ug/L)	Sample+ spike (ug/i)	Spike (ug/L)	Dup.+spike (ug/L)	Spike (ug/L)	Sample+ spike	Dup.+ spike	LCS sample
	299-E33-40-200	90-7064	<10	<10	H/A	<10	47.25	45.75	46.39	45.75	103.3	101.4	113.3
	299-E33-40-201	90-7065	<10	<10	N/A	<10	44.32	45.75	45.35	45.75	96.9	99.1	102.2
1	299-E33-40-20DA	90-7066	<10	<10	H/A	<10	46.39	45.75	47.94	45.75	101.4	104.8	104.1
							•			mean Std. Dev.	100.5 3.3	101.8 2.9	106.5 5.9

% recovery -----

Contract required detection limit for water = 10 ug/L Contract required detection limit for soil = 1.0 mg/kg

7

## FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 mg/Kg, therefore free cyanide analysis was not performed on the samples in this set.

#### GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid extraction procedure PNL-ALO-101 "Acid Digestion for Metal Analysis". The methodology is consistant with CLP procedure for acid digestion of waters and sediments. Acid extractions were conducted in 125 mL narrow mouth bottles. Extracts were analyzed by graphite furnace atomic absorption spectrometry (GFAAS) following procedure PNL-ALO-215 and PNL-ALO-216 for selenium and bismuth, respectively. Se and Bi procedures were consistant with CLP SOW 788 GFAAS Methods. Digestion of samples and GFAAS analysis were performed in building 325. The CLP SOW 788 and contract required hold times of 180 days and 120 days, respectively, were met.

Analyses for Se and Bi were conducted on a Perkin-Elmer 5100 without a Zeeman attachment. Quarterly Perkin-Elmer 5100 instrument detection limits (IDL) for Se and Bi were found to be 1.3 and 4.3  $\mu$ g/L, respectively.

Average recovery of Se digestion spike was 0% in soil and 87% in water. Lack of digestion spike recovery in soil and sediment samples was attributed to spectral interferences due to iron or other analytes. Use of a Zeeman background correction system should eliminate most interferences in Se analysis. Average recovery of post-digestion Se spike was 93% in soil and 92% in water.

Se analyses required dilution of the sample 1:10 in order to reduce interferences. This dilution prevented reporting Se values down to the CRDL of 0.5 mg/Kg in soil. Therefore Se in soil is reported down to 5.0 mg/Kg as specified in the 200-BP-1 PMP.

Average recovery of Bi digestion spike was 47% in soil and 81% in water. Average recovery of post-digestion Bi spike was 77% in soil and 95% in water.

Precision of sample duplicates was omitted as Se and Bi concentrations were below detection limits.

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TABLE 6: SELENJUM ANALYSIS DATA

ACID EXTRACTABLE SELENIUM IN SAMPLES

#### SOLID SAMPLES

%recovery ..... 85 -----B3-----86 84 Post **B2** Post В1 Sample Dup Spike LCS Samole Spike Spike Blank Sample+ Spike Dup.+spike Sample+ Dup.+ (mg/kg) (mg/kg) spike spike sample Sample 1D# (mg/Kg) Mec. (mg/Kg) Mec. **XRPD** spike (mg/kg) (mg/kg) (mg/kg) PHL Log# <5 <0.5 <5.0 0.1 <5.0 0.1 0.0 0.0 72.0 299-E33-40-201.7 90-7062 <5 R/A 97 105 90-7062-AS <5 R <5 299-E33-40-201.7A 90-7063 R/A 90-7063-AS 0.0 0.0 72.0 mean

65 assumes average B1-B2 sample weight for mg/kg equivalent

#### WATER SAMPLES

\*recovery **B3 B6** 84 **B**5 **B1** Post 62 Post Spike LCS Sample Sample Bup Spike Blank Sample+ Spike Dup.+spike Spike Sample+ Dup.+ (ug/L) sample XRPD (Ug/L) spike (ug/L) (ug/L) (U9/L) spike spike Sample 1D# PNL Log# (ug/L) Mec. (ug/L)炽ec. 109.0 10.0 85.0 299-E33-40-200 90-7064 <5 <5 R/A <5 8.5 10.0 89.0 92 90-7064-AS 86 <5 299-E33-40-201 90-7065 **<**5 H/A 90-7065-AS 93 <5 299-E33-40-200A 90-7066 <5 N/A 90-7066-AS 95 109.0 mean 85.0 89.0

Contract required detection limit for water = 5 ug/L Contract required detection limit for soil = 0.5 mg/Kg

(a)Used a dilution of ICV-2=26.4 ug/L

(b)Analytical spike(AS)=10 ug/L

(c)Pre-digestion spike=10 ug/L

(d) LCS standard (1CV-2)

(e)RPD only calculated if both sample and dup. are <DL

Reported values for Se in soil (except for 85 blank) follow a 1:10 dilution of digestate; thus the pre-digestive spikes are reduced to concentrations significantly below detection levels. The additional dilution increases detection limits by a factor of 10.

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#### TABLE 7: BISMUTH ANALYSIS DATA

#### ACID EXTRACTABLE BISMUTH IN SAMPLES

SOLID SAMPLES -----

									_			•••••		у
			Post		Post				3	•••••	6	B3	Bó	B4
		<b>B1</b> Sample	Spike	52 Sample	Spike		85 Blank	Sample+	Spike	Dup.+spike	Spike	Sample+	Dup.+	LCS
Sample ID#	PNL Log#	(mg/Kg)	%Rec.	dup. (mg/Kg)	XRec.	*RPD	( g/L)	spike ( g/L)	(g/L)	( g/L)	( g/L)	spike	spike	sample
			****	*********			•••••	••••••			•••••		•••••	******
299-E33-40-201.7	90-7062	<1 UJ	•	<1		R/A	<1	0.74	1.82	0.88	1.64	40	54	87
299-E33-40-201.7	90-7062-AS		80		80									
299-E33-40-201.7A	90-7063	ব এস		<1			<1							
299-E33-40-201.7A	90-7063-AS		71									-		
												*****	******	******
											mean	40.0	54.0	87.0

mean

82.0

80.0

94.0

B5 assumes average B1-B2 sample weight for mg/Kg equivalence

WATER SAMPLES

%recovery -----**B3** В4 Post Post 86 B2 Sample B5 Blank LCS Bi Sample Spike Spike Sample+ Spike Dup.+spike Spike Sample+ Dup.+ spike (Ug/L) \*Rec. dup. (ug/L) %Rec. **XRPD** (ug/L) spike sample Sample 10# PNL Log# (ug/L) spike (ug/L) (Ug/L) (U9/L) ..... <10 20.0 82.0 80.0 94.0 299-E33-40-200 90-7064 <10 N/A <10 16.4 20.0 16.0 97 93 299-E33-40-20B 90-7064-AS 299-E33-40-201 90-7065 <10 <10 <10 299-E33-40-201 90-7065-AS 96 299-E33-40-200A 90-7066 <10 <10 <10 299-E33-40-200A 90-7066-AS 94

Contract required detection limit for water = 60 ug/L Contract required detection limit for soil = 10 mg/Kg (a)Used a dilution of NBS Bi std.= 25 ug/L (b)Analytical spike(AS)=20 ug/L (c)Predigest spike=20ug/L (d)84 for soils=LCS-0287+1200ug/L Bi spike (1:100 dil.) (e)RPD only calculated if both sample and dup. are <DL

**B1 - WESTINGHOUSE CHAIN OF CUSTODY,** 

SAMPLE ANALYSIS REQUEST FORMS

AND PNL SAMPLE RECEIPT FORMS

Company		. CHAIN OF CUSTODY						
ampany Contact. W.S. THOM	, pson	Telephone <u>-509 - 376 - 2163</u>						
nple Collected by LU.S. THOWNS								
Sample Locations 200-8P-1 (200	DEAST) 299-E33.	40 WELSITE	ीळ्य					
Ice Chest No. ALPHH #2 POL	y coales / Fig	eld Logbook and Page No. WHC-N- 287-Z. A	394-90					
Remarks _ <u>All Abel + wate</u>	en complex to be	Panalused Lary 200-8P-1 Pana	meters					
of Interest supports	745K#6 1	of the RI/FS see statement	* 1					
Bill of Lading No. NA	_	fsite Property No. <u>N A-</u>						
Method of Shipment <u>hand ca</u>		to 325 PNL LAB						
Shipped to <u>326 PNL LAB</u>	(300 ALEA)	•						
Possible Sample Hazards <u>nona</u> C	ndicated wu	the hand-held field inter	une					
	·							
	Sample Identi	fication						
299-E33-40-200	· •	4) 299-E33-40-201.7	•					
1,500ml. CLEAR GLASS; WATER	2° Antonia - Tarrita							
3.1-liter, AMBER GLASS WATER 2ml		1, 2-LITER; CLETIE GLASS; SOIL; 20008-1	DATAM					
	Chen.	5) 299-E33-40-2017A						
3, 1-liter; Amberglass; water; 2ml	WALL CIATHEREN (F	1,2-11TER; CLEAR CLASS; SOIL; 200-BE						
299-E33-201-WST 12/14/90		1, L-LITER; CLERR CLASS; SOIL; 200-BI	2-1 faron Of Int					
	_							
500ml. clearglass; water a	nione + tritium		$\angle$					
3, 1-liter, Amore wass; water a	nions + tritium		<u>Z</u>					
500ml. clearglass; water a	nions + tritium		<u></u>					
3, 1-liter, amberglass; water; 3, 1-liter, amberglass; water;	nions + tritium		<u>Z</u>					
3, 1-liter, Amore wass; water; 3, 1-liter, Amore wass; water; 3, 1-liter, amberglass; water; 294-E33-40-201A	nions + tritium  Zml. HNO3; nutals + Zml. NaOH; nN+ Free CN		<u>Z</u>					
3, 1-liter, Auger wass; water; as 3, 1-liter, Auger wass; water; 3, 1-liter, amberglass; water; 294-E33-40-201A	nions + tritium  Zml. HNO; nutals + Tadchem Zml NaOH; NHFree CN  Onl + tritium		<i>Z</i>					
3 1-liter, Amberglass; water as 3, 1-liter, Amberglass; water; 3, 1-liter, amberglass; water; 299-E33-40-201A  1,500ml, clearglass; water; and 3, 1-liter, Amusex wass; water; and 3, 1-liter, Amusex wass; water; and	nions + tritium  Zml. HNO2; nutals + Zml. NaOH; nutals + CN  CM  Mil Varion  CM  Mil v tritium  Zml. HNO2. Mutals		<u>Z</u>					
3, 1-liter, Auger wass; water; as 3, 1-liter, Auger wass; water; 3, 1-liter, amberglass; water; 294-E33-40-201A	nions + tritium  Zml. HNO2; nutals + Zml. NaOH; nutals + CN  CM  Mil Varion  CM  Mil v tritium  Zml. HNO2. Mutals							
3 1-liter, Amberglass; water as 3, 1-liter, Amberglass; water; 3, 1-liter, amberglass; water; 299-E33-40-201A  1,500ml, clearglass; water; and 3, 1-liter, Amusex wass; water; and 3, 1-liter, Amusex wass; water; and	nions + tritium  Zml. HNO2; nutals + Zml. NaOH; nutals + CN  CM  Mil Varion  CM  Mil v tritium  Zml. HNO2. Mutals							
3 1-liter, Amberglass; water as 3, 1-liter, Amberglass; water; 3, 1-liter, amberglass; water; 299-E33-40-201A  1,500ml, clearglass; water; and 3, 1-liter, Amusex wass; water; and 3, 1-liter, Amusex wass; water; and	nions + tritium  Zml. HNO2; nutals + Zml. NaOH; nutals + CN  CM  Mil Varion  CM  Mil v tritium  Zml. HNO2. Mutals							
500ml-clear glass; water as 3. 1-liter, amber glass; water; 3. 1-liter, amber glass; water; 299-E33-40-201A  1.500ml, clear glass; water; and 3. 1-liter; amber glass; water; z. 3. 1-liter; amber glass; water; z.	chain of Poss							
500ml. Clear glass; water: a.  3. 1-liter, Amper wass; water;  3. 1-liter, amber glass; water;  299-E33-40-201A  1. 500ml., clear glass; water; and  3. 1-liter: Amber glass; water; 2  3. 1-liter: amber glass; water; 2	chain of Poss							
500ml-clear glass; water as 3. 1-liter, amber glass; water; 3. 1-liter, amber glass; water; 299-E33-40-201A  1.500ml, clear glass; water; and 3. 1-liter; amber glass; water; z. 3. 1-liter; amber glass; water; z.	chain of Poss	ession Date/Time:						
3. 1-liter, Auges wass; water; as 1-liter, Auges wass; water; 3, 1-liter, amberglass; water; and 299-E33-40-201A  1. 500ml, clearglass; water; and 3 1-liter; Armsex wass; water; 2  3. 1-liter; amberglass; water; 2  Relinquished by: W. S. THOMPSON	chain of Poss	ession						
3.1-liter, Auges wass; water; as 3.1-liter, Auges wass; water; 3.1-liter, amberglass; water; and 299-E33-40-201A  1.500ml, clearglass; water; and 3.1-liter; Amuses wass; water; 2  3.1-liter; amberglass; water; 2  Relinquished by: W.S. THOMPSON  9. Shompson	cons + tritium  2 ml. HNO; nutals +  2 ml. NaOH; antels +  CN  CN  CN  CN  CN  CN  CN  CN  CN  C	Date/Time:						
3.1-liter, Auges wass; water; as 3.1-liter, Auges wass; water; 3.1-liter, amberglass; water; and 299-E33-40-201A  1.500ml, clearglass; water; and 3.1-liter; Amuses wass; water; 2  3.1-liter; amberglass; water; 2  Relinquished by: W.S. THOMPSON  9. Shompson	cons + tritium  2 ml. HNO; nutals +  2 ml. NaOH; antels +  CN  CN  CN  CN  CN  CN  CN  CN  CN  C	Date/Time:   12/14/90   12/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90						
3.1-liter, Amberglass; water: a.  3.1-liter, Amberglass; water:  299-E33-40-201A  1.500ml, clearglass; water: and  3.1-liter: Amusex cans; water: and  3.1-liter: Amusex cans; water: 2  Relinquished by: W.S. THOMPSON  Relinquished by:	cons + tritium  2 ml. HNO; metals + rad-chem.  2 ml. NaOH; CN+ Free  CN  Chain of Poss  Received by:  Received by:	Date/Time:						
3.1-liter, Amberglass; water: a.  3.1-liter, Amberglass; water:  299-E33-40-201A  1.500ml, clearglass; water: and  3.1-liter: Amusex cans; water: and  3.1-liter: Amusex cans; water: 2  Relinquished by: W.S. THOMPSON  Relinquished by:	cons + tritium  2 ml. HNO; metals + rad-chem.  2 ml. NaOH; CN+ Free  CN  Chain of Poss  Received by:  Received by:	Date/Time:    12/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90   13/14/90						

300

1	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST						
	•	PART I: FIELD S	ECTION						
1	1.5 THOMPSON / RZ. ST	EFFLER	Date Sampled 12/14/90 Time 0530 hours Telephone (509 13762/53 1025						
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested 200-BP-1 PARAMETERS OF Interest						
299-€33-4	0-360		see Statement of work.						
	1,500ml. crear glass;	WATER	ANIOUS + trition						
	3, 1-liter: AMBERGLAS	WATER, 2ml HI	10: metals + rad chem.						
	3, 1-liter: amberglass	WATER 2ml N	AOH: CN-FreeCN						
749-E33-L	10-201								
		water	ancons atrition						
	, ,	water: 2ml	UNO2: metals + racl. chem						
	3, 1-liter amberglass								
(E) 299-E	3-40-201A								
<u> </u>	1	water .	anions a fritium						
	3,1-liter amberglas	uster 2ml	41NOz metals + rad. chem.						
	3, 1-liter aniwa glas	ustic Znl,	bom, CN+FreeCN						
(1) ====	<del></del>	<del> </del>							
4) 294-63	340-20.7								
	1 - 2-LITEL: PLEAK GL	ASS, SOIL	ou 200789-1 Parameters of Interest						
(5) 199-E	38-40-201.7A								
	1,2-LITEL: CLEAK GA	ASS: Soic: AL	1200BP-1 Parameters of Interest						
Field Informa		Wove sam	ples to be analyzed for						
Special Hand	lling and/or Storage NO h	aga. Ds in	diested on hand-held						
		PART II: LABORATO	DRY SECTION						
Pereived by	Lame > Kilkham		· 02141/21 esectitions Danseal						
alysis Req									

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A-6000-406 (07/89)

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

Deli	vered by: R.Z. STEFFLEK Date/Time: 12/14/90 1304
Rece	ived by: J M. ROBBINS
Cust	omer Sample Number(s): 199-133-40-201.7
ALO	Sample Number(s): 90-7062
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Shipment log and sample analysis
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: OK
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
•	Notes:
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). $\bigcirc \  \  \  \  \  \  \  \  \  \  \  \  \ $
6.	Condition of Sample Vials. $\bigcirc \leftarrow$
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies. $\mathcal{N}$

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-004

Deli	vered by: R.Z. STEFFLER Date/Time: 12/14/90 1304
Rece	ived by: J. M. ROBBINS
Cust	omer Sample Number(s): 299 - E33 - 40 - 201.7A
ALO	Sample Number(s): 90 - 7-063
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Scripping log and sample analysis requ
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: OK
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠,	Notes: .
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents. $\bigcirc \leftarrow$
8.	Resolution of Problems or Discrepancies. $\mathcal{H}$

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RETURN COMPLETED FORM TO PROJECT MANAGER

B01-005

Deli	vered by: <u>R Z. STEFFLER</u> Date/Time: 12/14/90 1304
Rece	eived by: J.M. ROBBINS
Cust	tomer Sample Number(s): 299 - E33 - 40 - 200
ALO	Sample Number(s): 90-7064
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Shipping leg and sample analysis
3.	
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠.	Notes:
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials. OF
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.

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RETURN COMPLETED FORM TO PROJECT MANAGER

B01-006

Deli	vered by: RZ STEFFLER Date/Time: 12/14/90 1304
Rece	ived by: J. M. ROBBINS
Cust	omer Sample Number(s): 299-E33-40-201
ALO	Sample Number(s): 90 - 7065
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Supping leg and sample analysis
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠.	Notes:
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). $\bigcirc \vdash$
6.	Condition of Sample Vials. O
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

Deli	vered by: RZ. STEFFLER Date/Time: 12/14/90 1304
Rece	ived by: J. M. ROBBINS
Cust	omer Sample Number(s): 299 - E33 - 40 - 201A
ALO	Sample Number(s): 90-7066
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Simplify leg and sample analysis
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
•	Notes:
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature)
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
8.	Resolution of Problems or Discrepancies.
	MA

RETURN COMPLETED FORM TO PROJECT MANAGER

## Attachment 8

Pacific Northwest Laboratory, 200-BP-1, Total Organic Carbon

Data Package 1

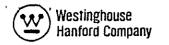
	DATA PACAGE VERIFICATION						
DATE RECEIVED: 11/7	90		95:1: Report 1, Rev. 0, TOC				
Leandon: PNL 3		db	ADJECT: 200-BP-1				
LABORGORY CONDICT: B.M. Gillispie MODET COORDINATOR: J.A. Levech							
·							
,	PRESENT	<b>MESENT</b>	TRACEARLE REMARKS				
Internal chain-of-custody	Χ_		·				
Lab chain-of-custody		Χ					
Aivbill	,	X	N/A Samples Hand Caecied to Lab				
Shipping Order		X	N/A Samples Hand Carried to Lab				
Signature and Tally		X	NA Saugles Hend Coursed to Lab				
Hazardous Materials Shipping		Х	N/A				
Request for Analysis	入						
Case Narrative	X						
Data reporting forms	X	·					
Raw data	Χ						
Electronic media		X	· N/A				
M DATA PROGREE VERIFIE	) AND ACC	P10: ,	2.M. Dancan 2-15-91				
	Duta Horaganent Clerk Date						
DATA PACKAGE ACCEPTED	WITH RE	visions:	Project Coordinator Cate				
A DULY INTERSTENDED !	EEID:		All Jewh 2/15/91				
. α	NOTERED:	(re	m + 1000 mo 2 15 91				
•		UZM !	Handgar				

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### OSM RCRA LEVEL C DATA ASSESSMENT

DATE 02/08/91 SAMPLES/MI REVIEWED BY JA Lerch for all sample begin w/6 LABORATORY PNL-325 Prefix  CASE # TPP 16572  SDG # Report 1: Rev O  DATA ASSESSMENT	49-578-160 48-50-168-1 49-578-160 48-50-168-1 49-578-161 48-50-168-2 50-538-155.7
QUALITY CONTROL CHECK ANALYSIS _T	oc
1. Holding Time	<u> </u>
2. Matrix Spike	0 \_
3. <u>Duplicate Analysis</u>	X
4. Blanks	<u> </u>
5. <u>Calibration/Control</u> Stds	<u>o</u> \
6. Other QC - see attachment	
7.	
8	
9	
10.	
<pre>0 = data had no problems X = data qualified due to minor proble M = data qualified due to major proble</pre>	ems ems/some data may be unusable
OVERALL ASSESSSMENT: no major proble	ems - all results
ecceptable w/qualific	
NOTES: none	

o Refer to the corresponding attachments for explanation of any problems.

Name JA Lecch 12 Date 02/08/91
Name <u>JA Lecch</u> Date <u>02/08/91</u> Oc Check: <u>Holding time</u>
comments: 14 day requirement met for all samples
· · ·
ACTION: NONQ
sample # constituent value/qual sample # constituent value/qual

Name JA Larch JL Dat	e · 02/08/91
QC Check: <u>reactria Spike</u>	
COMMENTS: <u>spike</u> & spike	Implicate 70R acceptable
- no MS or MSD regi	rired by sow or procedure
ACTION: none	
,	
sample # constituent value/qual	sample'# constituent value/qual

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2 of 6

	Name JA Lerch Date 02/08/90	
	QC Check: Duplicate Analysis	
	comments: all samples run in duplicate,  RPD's high (>152)	some
	ACTION: qualify associated results  per Osm quidelines	<u>os</u>
<i>CA9-</i> 49- COA-49- COA-50	Sample # constituent value/qual sample # constituent  49-578-157.50 -518-160 5-558-E5 5-538-155.1	. value/qual

 $\bigcirc$ 

3 of 6

Name JA Lerch / Date 02/08/91.
QC Check: Blanks
comments: daily blanks are used to set quantitation limits (see CASE NARRATIVE)  evaluation of contamination cannot
ACTION: be made, -all results sig > than
none
sample # constituent value/qual sample # constituent value/qual

<u>4</u> of <u>6</u>

# RCRA LEVEL C QC

Name JA Lerch	€ Date	02/08	3/91	
QC Check: <u>Calibration</u>	/conti	-012tz		
COMMENTS: <u>qlucose</u> sto	used	forc	alibration	<u>^;</u>
<u>recoveries</u>	accep-	table	· · · · · · · · · · · · · · · · · · ·	
	•			
ACTION: NON				
		<del></del>		
sample # constituent valu	e/qual	sample #	<u>constituent</u>	<u>value/qual</u>
	i.			
•				
		•		

in

<u>5</u> of <u>6</u>

# RCRA\_LEVEL\_C\_QC

Name JAlerch Ja Date 02/08/91
QC Check: Other QC
comments: <u>Table 2</u> : ug c in sample = result - blank value; sample values may be biased low
ACTION: _none_
<pre>sample # constituent value/qual sample # constituent value/qual</pre>
<u>6</u> of <u>6</u>

≥00-BP-1 SUMMARY TABLE Laboratory: PNL-325

SDG #: Report 1, Rev 0
Report 2, Rev 0
Report 3, Rev 0

#### TOTAL ORGANIC CARBON - soil sample value/qualifier

Sample Number	value/qualifier
Report 1	(ug/g)
49-57B-157.5	73 J
49-57B-157.5D	95 J
49-57B-160	69 J
49 <b>-</b> 57B-161	113
₹ 50-53B-EB	94 Ј
50-53B-155.7	43 J
48-50-168-1	176
48-50-168-176	149
48-50-168-2	131
48-50-176.7	221
52-54-168.5	280
	,
Report 2	(mg/Kg)
49-57B-216	96.0 J
49-57B-216-A	52.2 J
49-57B-220	39.0 J
49-57B-229	50.0 J
50-53B-208	22.6 J
50-53B-208A	26.5
50-53B-214	14.1
50-53B-225	56.6 R
Report 3	(mg/Kg)
	•
55-55-160	92.3
55-55-160-A	125
55-55-162	21.5 J
52-57-160	61.0
52-57-160-B	84.1
55-55-166	61.5
55-55-190	23.8
52-57-162.0	47.9
	1

not reported and/or requested

all sample numbers begin with 699- prefix

200-BP-1 SUMMARY TABLE Laboratory: PNL-325

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SDG #: Report 1, Rev 0

Report 2, Rev 0 Report 3, Rev 0

# TOTAL ORGANIC CARBON - water sample value/qualifier

Sample Number	value (ug/ml)/qualifier
Report 1	
no water samples	
Report 2	
49-57B-216B	0.67 Ј
49-57B-216C	0.40 Л
49-57B-216D	0.16 J
49-57B-229A	1.34 J
keport 3	
E0 E7 1E7 3	0.41
52-57-157-A	0.41
52-57-157-B	0.99
55-55-160-A	0.65

NR not reported and/or requested

all sample numbers begin with 699- prefix

#### INTRODUCTION

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This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Draft WHC Statement of Work and a Draft PNL Statement of Work which became the Draft Technical Project Plan (TPP) 17662. The analytical procedures required for analysis were defined in a letter to the Task Leader. This data report contains no technical assessment of the analytical results.

Eleven soil samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms in April and May of 1990. The samples were delivered at refrigerated temperature to Building 325 in the 300 Area. The samples were analyzed in the 325 building.

The requested analysis for these eleven soil samples was Total Organic Carbon by SW 846 Method 9060. The procedure used was PNL 7-40.37, which is comparable to SW 846 Method 9060. There were no further requests for analysis of the other parameters of interest addressed in the QAPjP ALO-001. The quality control (QC) requirements for each sample were defined in a letter to the Task Leader as directed by the client, WHC. The QC requirements outlined in SW 846 Method 9060 are for quadruplicate analysis of each sample. WHC directed PNL to analyze the samples only in duplicate with a method blank per each batch of samples analyzed. All QC data that exist are include in this Data Report/Package.

The data in this package are reported in Table 2. The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody and Sample Analysis Request Forms and one that contains the primary analytical data.

#### **CERTIFICATION STATEMENT**

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B.WI. Villepie

B. M. Gillespie 200-BP-1 Project Manager 11-05-90

Date

11/05/90

#### Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPJP ALO-001.

J. L. Daniel

PNL ACL Quality Representative

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<u>Table 1</u>: 200-BP-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number
699-49-57B-157.5	90-3280
699-49-57B-157.5D	90-3281
699-49-57B-160	90-3282
699-49-57B-161	90-3283
699-50-53B-EB	90-3314
699-50-53B-155.7	90-3315
699-48-50-176	90-3460
699-48-50-176.7	90-3461
699-48-50-168-1	90-3462
699-48-50-168-2	90-3463
699-52-54-168.5	90-3728

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#### TOTAL ORGANIC CARBON ANALYSIS RESULTS

The sample and its accompanying QC samples were prepared by procedure PNL-7-40.37, Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer. The methodology is consistent with SW 846 Method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure and calculations.

With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major source of carbon in the blank is adsorbed CO<sub>2</sub> on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to determine the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit. For purposes of this report, the daily blank value is used as the lower quantification limit for the analyses. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported in this data package. This "method detection limit," defined as three times the standard deviation of the blank values, is  $\sim 5~\mu g$  of total organic carbon in the analytical

sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPJP ALO-001) ranged from less than 1% to 53%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard results (of the same Kodak  $\alpha$ -D Glucose standard) for this set of data, the recoveries ranged from 80.4% to 98%. The average recovery was 92% with a standard deviation of 5%. The conclusion is that the <u>best</u> that can be expected from the procedure (at concentrations >25 times the nominal detection limit) is a precision of  $\pm$  5% relative, and a bias (accuracy) of -8% on the average.

10

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for the eleven sample analyses in this data report.

11:2 10354

Table 2: 200-8P-1 Total Organic Carbon Analysis Data

WHC Sample ID#	PNL-ALO #	Sample wt.g	ug C Blank (Pt Boat in Ladle)	ug C Result	ug C in Sample	ug C/g Sample	% std dev of Dups	Date Sampled	Date Analyzed	Glucose Spike g	ug C Spike g	ug C (Spike) Sample + Blank) Observed	% Spike Recovery
699-49-578-157.5 H	90-3280 N	0.18792 0.19745	4.75 4.75	37.29 28.45	32.54 23.7	173 <sup>-</sup> 2 120	26%	4/24/90 4/24/90	4/27/90 4/27/90				
699-49-578-157.50	90-3281 ¤	0.25495 0.31045	4.75 4.75	29.06 21.47	24.31 16.72	95 J 54	39%	4/24/90 4/24/90	4/27/90 4/27/90				
699-49-578-160 u	90-3282 "	0.27366 0.27637	4.75 4.75	23.53 19.3	18.78 14.55	69 I 53	19%	4/24/90 4/24/90	4/27/90 4/27/90				
699-49-578-161 u	90-3283 #	0.27576 0.34931	3.16 3.16	34.41 42.35	31.25 39.19	113 112	1%	4/24/90 4/24/90	4/30/90 4/30/90				
699-50-538-EB	90-3314 N	0.18475 0.24803	2.92 2.92	20.23 17.13	17.31 14.21	94 T 57	34%	4/25/90 4/25/90	5/01/90 5/01/90				
699-50-538-155.7	90-3315 #	0.29305 0.3047	2.92 2.92	15.63 31.92	12.71 29.05	43 J 95	53%	4/25/90 4/25/90	5/01/90 5/01/90				
Spike													
699-49-578-157.50	90-3281	0.14141	4.8	•	(10.55)		-	4/24/90	5/03/90	0.0030	(1228)	1090.7	87.56
Spike Duplicate													
699-49-578-157.50	u	0.15612	4.8	-	(11.65)		•	4/24/90	5/03/90	0.0040	(1608)	1455.39	88.84
6699-48-50-168-1	90-3462 "	0.2176 0.26443	4.67 4.67	43.02 42.03	38.35 37.36	176 141	15X	5/03/90 5/03/90	5/15/90 5/15/90				
699-48-50-176 <sup>M</sup>	90-3460 #	0.2063 0.2602	12.48 12.48	43.29 50.84	30.81 38.36	149 * 147 *	1%	5/04/90 5/04/90	5/16/90 5/16/90			11	
699-48-50-168-2 N	90-3463 **	0.3129 0.30397	4.67 4.67	45.72 49.18	<b>41.</b> 05 <b>44.</b> 51	131 146	8%	5/03/90 -5/03/90	5/15/90 5/15/90			10	1
699-48-50-176.7	90-3461 "	0.1986 0.1997	12.48 12.48	56.34 55.99	43.86 43.51	221 * 218 *	1%	5/04/90 5/04/90	5/16/90 5/16/90		l	02/08	/90
699-52-54-168.5 H H	90-3728 <sup>81</sup> H	0.12935 0.11188 0.1258 0.12742	4.42 4.42 4.42 4.42	40.65 42.41 38.86 43.24	36.23 37.99 34.44 38.82	280 340 274 305	. 10%	5/22/90	5/30/90				

<sup>\*</sup> Results may be low due to uncertainty in blank value. Based on an average blank value of 5 ug C, the reported sample values may be -20% low.

# B1 - WESTINGHOUSE CHAIN OF CUSTODY AND SAMPLE ANALYSIS REQUEST FORMS

Westinhouse Hanford Company	CHAIN OF	CUSTODY
Company Contact W.S. Thompson	Telephone	(509)373-388
Sample Collected by W.S. Thompson J	TWROBERTS Date 4/24/90	Time 0930,0830,1020
Sample Locations <u>699-49-578</u>		11130
Ice Chest No. RM #9	Field Logbook and Page	NO. WHC-N-385-1
Remarks Soil complex in 125	ne bottles, onice, sent +	0 325 PNL lab for
analysis of Total organi		
Bill of Lading No.	Offsite Property No	
Method of Shipment hand carry or	ASL Sample van to:	325 PNL lab
Shipped to 325 Bldg PNL		
0,	Sample Identification	
1)699-49-578-157.5	(90-3	280) anolysis
1 125 mg, recorders soil Sw-	846, Nexted 9060, Toc, che	mical analists wstykylgo
10 3 17		
2) 699-49-57B-157.5D	(90-3	281)
1, 125ml, clear glass, Soil, Sw	-846, Method 9060, TOC, CI	nemical analysis
· ·		
3 699-49-57B-160: 1,125 nd, Clea	arglass; soil; Swelle, Method	900 T.O.C. Chemical
T4)699-49-57B161;1,125ml,cla	arglass; soil; SW846, Method 90	060, T.O.C.; Chemical analysis
		32 83)
	<del>/</del>	
		<del></del> _
		<del>/</del>
	Chain of Possession	
Relinquised by:	eceived by:	Date/Time:
Fordy S Thompson	m steele.	4/24/90 1245
	eceived by:	Date/Time:
SIIISleed	wans & Bellofatto	4/24/90 2:40
_	eceived by:	Date/Time: .
	Gerald a. Ross	4/27/70 8:10.
7   4 ' '	leceived by:	Date/Time:
••	•	

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~>

) ( <u>v</u>	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST			
		PART I: FIELD SE				
Collector U	O.S. Thompsoil		Date Sampled 4/24/90 Time 0930 hour			
Company Cont	iaca W.S. Thompso	L; JW Robert	3 Telephone (509 ) 373 - 3818 1020 ;			
Sample Number	Number and Type of Sample Containers	Type of Sample	Analysis Requested			
697-49-578-	157.5: 1, 125 ml clear	calass soil s	W846-Method 9060; chill on ice			
169-49-578	157.5 D: 1 125 Ml. Clea	chlass Soil, Su	846 Method 9060 Thellonice			
699-49-57B	160: 1 125 NR CHORA	1955; soil, SW8	46 Method 9060; Toe; chill on ice 6. Method 9060; T.O.C; Chill on ice			
699-49-57B	161: 1,125 ml clear cl	bst: 5011, 5W84	6, Method 9060: T.O.C; Chill on ce			
,						
	•					
<u> </u>						
	,					
Field Informa SWS6 Vrio	SW846, Method	des to be	shipped 6325 PNLlab for TOG			
Special Hand	ling and/or Storage/V	one.				
		PART II: LABORAT	ORY SECTION			
Received by		Tiela	Date			

A-6000-406 (07/89)

<sup>\*</sup>Inditate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

pilector <u>[]]</u>		PART I: FIELD SI	
pilector <u>[]].</u>		PART I. PIELD 3	ECTION
ompany Cont	J. Thonipsort, . I tack WS Thomps	W. Roberts	S Date Sampled 4/25/90 Time <u>0730',</u> hours Telephone (509)373-38/8 0750
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
19-50-538-E	B 1, 125 ml cles glass,	oul, 5W846.	Method 9060, TOC (90-3314)
9-50-53 <i>8</i> -	155.7 1,125 ml, clear g	355, 501, 5WS	Method 9060, TOC (90-3314) 46, Method 9060, TOC (90-3315)
		<del></del>	
	<u> </u>	100	
		9/1.50	
	<del> </del>		
<del></del>			
Field Informa	ation** <u>Soil Name</u> SW-846, Mez	les) to be a kod 9060.	analized for Total Organic
Special Hand		carry san	uples in ASL Sample van to
		PART II: LABORAT	ORY SECTION
P~~ived by		Title	Date

"Indicate whether sample is soil, sludge, water, etc.
""Use back of page for additional information relative to sample location."

A-6000-406 (07/89)

Westinhouse Hanford Company	CH	IAIN OF CUSTODY	
Company Contact (1), S. Trombs	øn .	Telephone (509) 373-3818	
Sample Collected by W.S. Thomps	on J.W. Roberts 4/2	5/90 Time 0730, 0750	_
Sample Locations 699-50-538 W	eusite		
ice Chest No. RM#9, Gott R	bluecoler Field Logbook	and Page No. 1040-N-385-2	_
Remarks Soil samples To	be analysed for	Jotal arganic Carbon	ا زید
SW-846; Mertind 9060		· · · · · · · · · · · · · · · · · · ·	
Bill of Lading No		ty No <i>N   A</i>	
		SL sample van to 3254	<u> 27</u> /L
Shipped to 325 PIVL Labor	ntory		
	رب Sample Identification	PNL	
11699-50-538-EB -1-125ml cle	•	Wethod 9060, TOC (90-331	4)
1)699-50-538-EB -1-125ml, cle 2)699-50-538-155.7 1,125ml, cle	acciloss soil, 5W846. 1	Nethod 9060, TOC (70-331	<u>5</u> )
·			_
-			
			_
<u> </u>			***
			-
	<del></del>		_
	<del></del>	<del></del>	
	<del></del>		
		· <del></del>	
	Chain of Possession		
Relinquised by:	Received by I A	Date/Time: /	
Hendy & Shom son	Month to los	4/25/90 / 12217	
	Received by:	Daye/Times	
1 Smittooto	Authemal	7/25/90 1436 A	Wy .
Relinquised by:	Received by:	Date/Time:	
- MILHADON	-Dorold Kon	4/2-190 1400	
	Received by:	Date/Time:	
:	•		

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		HAIN OF CUSTODY
Company Contact (1.5. Thompson	7	Telephone(\$09) 373-3818
mple Collected by 15 Thom from	J.W. Roberts Date 5-4.	
Sample Locations <u>699-48-50</u>		, A4-6w
ce Chest No. RMF3	Field Logboo	k and Page No. <u>WH C-N-287-2</u> **54
Remarks Soil Samples in 125	ml bottles chilledon ice.	sent to 325 PNI leb los TOC
analysis.	7	
Bill of Lading No. NA	, Offsite Prope	erty No. <u>NA</u>
Method of Shipment <u>Landcarrus</u>	d in ASL sample was	to 325 PNL lab in 300 area.
hipped to 325 Alda, PN	(300 area)	
1100 10 00 171	Sample Identification	
) 699-48-50 - 176	CURLL WATER PROCE	TOC Chemical analysis
,125 mx, clear glass, soil, 3	6W846, Method 9060	100 Cremical armysis
1) 100 40 00 171 5		
1) 699-48-50-176.7	100 000 000 10 100000 5	
1,125 ml, class glass, soil, S	10-846, Mothod 9000, 7	OC Chemical analysis
	<del></del>	
		1
		<del></del>
	Chain of Possession	
Relinquised by:	Chain of Possession Received by:	Date/Time:
Jame W - Roberto	Received by:	5-4-90 1209
Jame W - Roberto	<del></del>	5- 4-90 1209 Date/Time:
Relinquised by:	Received by:  Received by:  Received by:  ACLANA JUBONE	5-4-90 1209
Relinquised by:  Relinquised by:  Relinquised by:	Received by:  Received by:  Received by:  Received by:	5- 4-90 1209 Date/Time:
Relinquised by:  R. 3. Styll	Received by:  Received by:  Received by:  Received by:	5-4-90 1209 Date/Time:  1 at 5-4-90 2:26 p

<u>(v</u>	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST				
PART I: FIELD SECTION						
	S. Ilompson, act W.S. Ilompson,	J.W. Roberts	Date Sampled <u>5-4-90</u> Time <u>//30</u> hours Telephone (509_)373-3818			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested			
199-48-50-17	5 1,125 ml clien ale		46-Method 9060 TOC, chilled mice			
699-48 <del>-</del> 50- <sub>1</sub>	76.7 1,125 ml, close ge	120, soil, 5008	46 Mithed 9060, ToC, Chilled on ice			
) <del></del>						
	ation** soil samples to be well, Method 9060.  ling and/or Storage Kup sa		DOE wehicle) to 325 PNL let for TO			
		PART II: LABORATO	RY SECTION			
ļ		. Alt. 11. Dagger 10.				

\*Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

Westinhouse Hanford Company	CHAIN OF	CUSTODY
Company Contact <u>U.S. Thompson</u>	Telepho	ne (509) 373 - 38/8
Sample Collected by W.S. Thompson, T.W.	Roberts Date 5/3/90	Time 1415, 1415
Sample Locations 699 - 48 - 50	, .	<u> </u>
Ice Chest No. <u>RM # 3</u>	Field Logbook and Pag	e No. WHC - N-287-Z p.1-2
Remarks Soil samples in 125 ml both	es on ice sent to 325 PM	4 lab for analysis
of Total Organic Carbon (7		
Bill of Lading No. NA	Offsite Property No.	NIA
Method of Shipment Hand carry on	154 sample van to 325 Pi	NL lab. 325 Blda. PNL
Shipped to 325 Bldg., PNL		
0,	Sample Identification	
1699-48-50-168-1		
1.125 ml clear glass, soil, SW89	44, Method 9060, TOC chemi	cal analysis
2/699-48-50-168-2		
-1,125 ml, clear glass, soil, swsq	16, Method 9060, TDC, chene	ical analysis
		· · · · · · · · · · · · · · · · · · ·
, /	<u> </u>	
		<del></del>
	<del></del>	
	Chain of Possession	
Relinquised by: / Re	eceived by:	Date/Time:
Some W. Robert	RI Styl	5-3-90 1451
Relinquised by: Re	eceived by:	Date/Time:
R. Street	linin & Bello Vatto	5-4-90 2:26 p
Relipquised by Re	eceived by:	Date/Time:
- Design & Bellowatto	S. V. Onelan	5-14-90 / 1355
	eceived by:	Date/Time:

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<u>.</u>

(3	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST
		PART I: FIELD SE	CTION
Collector <u>ப</u> ு.	S. Thompson,		Date Sampled <u>5/3/90</u> Time <u>/4/5</u> hou Telephone ( <u>509) 373 - 38/8</u> 1415
Company Con	ntact W.S. Thompson, J.W	Roberts	Telephone (509) 373 - 3818 1415
· · · · · · · · · · · · · · · · · · ·		<del>,</del>	
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
6 <del>99-48-50-</del> 16	8-1: 1.125 Ne dear glass s	21 SW846 MAN	(nd 9060, TOC; chill on ice
699-48-50-16	8-2. 1, 125 ml clear alass, s	of SUS46 Men	and 9060, TOC; chill on ice
		1	
			. /
	,		
·			
			·
Field Inform	ation** <u>Soil samples to b</u> 9060 °, KRRP So	he shipped to 3 amples Chill	25 PNL lab for TOC SW846, Method ed.
Special Hand	dling and/or Storage None		
		PARTII: LABORATO	DRY SECTION
1			Date

Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

ompany Contact	Thompson W.S. Thompson	PART I: FIELD SECT	TON  Date Sampled <u>5/22/90</u> Time <u>1020</u> hours  Telephone (509) 373-3818
ompany Contact			· <del></del>
ompany Contact			· <del></del>
			المراب
Sample Nu			
Number	mber and Type of Sample Containers –	Type of Sample*	Analysis Requested
99-52-54-168	15:1,125 ml, amber	glass; soil; su	0-846; 9060 Method; T.O.C. chillon
			<del>\</del>
		1	
		. /	
		<del>[</del>	
	<del>/</del>		

Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

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A-6000-406 (07/89)

Westinhouse Hanford Company	CHAIN OF	CUSTODY
Company Contact W.S. Thompson	Telephor	ne(509)373-3818
Sample Collected by W.S. Thompse	on Date _5/22/90	Time /020
Sample Locations 1099-52-54 (2)	exporable unit around	duater borehole)
ice Chest No. RM#7 poly Coole	Field Logbook and Page	No. WHC-287 WHC-N-287-2
Remarks Soil Samples in 125	al bottles on inia spat to	305 DALL lab for attitudes
OF TOTAL ORGANIC CARROL		
Bill of Lading NoN/A	Offsite Property No.	NA
Method of Shipment hand carr	• · ·	- · <del></del>
Shipped to 325 Bldg. PNL	<del>)                                    </del>	
2100 10 01 1101	Sample Identification	
1) 699-52-54-168.5 amber of stake		
1,125 mi., Alter glass, Soil, Su	)-846, Method 9060, TOC, Cher	nitai analysis
	<del></del>	
		<del>-/</del>
	<del></del>	
ļ	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
	<i>V</i> '/	
	<i>/</i>	
	<del>/</del>	
	<del></del>	
		<del></del>
		`
	Chain of Possession	
Relinquised by: Wendy S. Thompson	Received by: C.S. McClellan	Date/Time:
Trendy S. Thompson	SMi COUL	5/22/90 13:45
	Received by:	Date/Time:
Combella 4	S. V. Burker	5-22-90 13:58 hrs
Relinquised by:	Received by:	Date/Time:
SV. Order	22 St K. 0 - 1	5-30-90 1340
Relinquised by:	Received by:	Date/Time:
	•	

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#### SAMPLE RECEIVING/LOG-IN INFORMATION

Sample Log-In Information
Person Receiving Sample: <u>NAIE ARC'NER</u> Date <u>5-22-90</u>
Sample Log-In Number(s): 40-3728 *
Client Sample Number(s): 1699-52-54-168.5 *
In-House Sample Number:
Results Required By: 6/5/90 Client/Project: W.S. Thompson
Work Package/Charge Code: QA Plan:
MA-70 Impact Level: EPA Analytical Level:
Requested Analyses:
Lab Technical Leader: Bob Strongatt
Client Point of Contact: 5.05. Thompson Phone: 3-3818
Sample Archive Requirements: N/A
Hazardous Waste Disposal Issues: $\sqrt{/A}$
Special Requirements: $N/A$
Special Requirements
Sample Deceiving Information
Sample Receiving Information
Condition of Shipping Container:
Chain-of-Custody Records Included? Yes X No
Chain-of-Custody Requirements: $\underline{\qquad}$
Condition of Samples: 900
Discrepancies in Shipping Records/Samples? Yes No _X
Sample Storage Location: LAB 301-A REFRIGERATOR
Sample Storage Requirements: 4°C ± 3°C
Sample Custodian: DALE ARCHER.

<sup>\*</sup> See back of form if more than one sample number per page

#### Attachment 9

Pacific Northwest Laboratory, 200-BP-1, Total Organic Carbon

Data Package 2

DATA PACAGE VERIFICATION					
DOTE REDETIVED: 11 2-	DOTE REDEIVED: 11/27/90   SOCI: Report 2, Rev. O, TOC				
LAGOROGON: PNL 32	25 l	iab	MODET: 200-BP-1		
LIBORGORY CONTACT: BJA	. લાંાાં	spie	MOJECT COORDINATOR: J.A. Lerch		
`	PRESENT	ABSENT	TRYCEARLE REMARKS		
Internal chain-of-custody	X		•		
Lab chain-of-custody	X				
Alvbill		X	NA Samples Hand Consider to Lak		
Shipping Order		X	N/A Samples Hand Consider to Lak N/A Samples Hand Consider to Lak		
Signature and Tally		Χ	N/A Samples Hand Crusied & Lab		
Hizardous Materials Shipping		X	NA		
Request for Analysis	X				
Case Narvative	X				
Data reporting forms	X	<u> </u>			
Raw data	Х				
Electronic media		X	· NA		
DULY BUCKUSE VOCEDLI	ed with R	evisions Pro	Project Coordinator  Project Coordinator  Aute  2/15/91  Auto		

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P. . .

#### OSM RCRA LEVEL C DATA ASSESSMENT

DATE 02/09/91		49-578-216	49-518-229
REVIEWED BY JA Lerch	-all samples begin w/Ggg	49-578-216A	49-573-299
LABORATORY PNL-325	prefix	49-578-216B	<u>50-558</u> -208
CASE # TPP 16772		49-578-216C	<u>50-538</u> -208A
SDG # Report Z; Rev O		49-578-220	50-535-214
Toc		49-578-216D	50-538-ZZ5
DAT	A ASSESSMENT SUMM	ARY	
QUALITY CONTROL CHECK	ANALYSIS TOC	•	
•			<del></del>
1. Holding time	X	<del>\</del>	
2. <u>Spike Analysis</u>	X	<u> </u>	•
3. <u>Duplicate Analysis</u>	÷ <u>×</u>		
4. Blanks	<u> </u>		
5. Calibrations/Contro	0 421		
6. Other QC	<u> </u>		\
7.			
8.			
9.			
10.			
<pre>0 = data had no problems X = data qualified due to M = data qualified due to</pre>	minor problems major problems/:	some data may be (	unusable
OVERALL ASSESSSMENT:	esult for 69	<u>9-50-538-225</u>	unusable
(R) due to high de			
results acceptab			
NOTES: see "other QC" -	•		· /····teix
TOTELS.	197 7500, 6T	3000 -3	1 MONI 11 V
			<del></del>

o Refer to the corresponding attachments for explanation of any problems.

54 790004

RCRA LEVEL C OC

	Name JA Lerch 1 Date 02/07/91
	QC Check: Holding Time
	comments: Holding time (14 days) exceeded on
	several samples
O	
Pro Contraction of the Contracti	ACTION: qualify results as per asm guidelines
<b>^</b> 3	
699-49- 699-49- 699-49-6	sample # constituent   value/qual   sample # constituent   value/qual
	I of 6

RCRA LEVEL C QC Name JA Lerch / Date <u>02/09/91</u> QC Check: Spike Analysis comments: <u>some weter spike recoveries low</u> -no spikes on soil samples (none were required by the sow or PNC procedure) ACTION: quality results as per osm quide lines sample # constituent value/qual sample # constituent value/qual 699-49-5713-2165 TOC 699,49-518-216C 699-49-57B-216D

2 of 6

### RCRA LEVEL C QC

	Name JA Le	sch /d	Date	2/09/9	1	
	QC Check: Du	//	<u> </u>	_		
	COMMENTS: Say					
	-Dev for	699-49-5	3B-22 <u>5</u>	very his	h (887	<u>3,)</u>
		1.16	1.1			
	ACTION: qua	lelines	altr as	per os	im	
				•		
699-47 699 <b>-50</b> 695- <b>50</b> -	sample # const 578-216 To -578-229 -538-208 538-225 578-216C	ituent value	7	mple# cons	<u>stituent</u>	value/qual
						_

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# RCRA LEVEL C OC

Name JA Lerch 11 Date	02/09/91
QC Check: Blanks	
comments: deily blanks as quantitation limit - evaluation of poss cannot be made	to set CASE NARRATIVE) ible contamination
ACTION: NOW	
sample # constituent value/qual	sample # constituent value/qual

4 of 6

# RCRA LEVEL C QC

Name	Alerch	A Date	02/09	191	
QC Check:	albratio	ns/Contro	264 <u>2)</u> c		
COMMENTS:	<u>Calibrat</u>	tion and	contro	1 Ad 7	6R
••					
ACTION: _	none				
sample #	constituent	<u>valúe/qual</u>	sample #	<u>constituent</u>	value/qual
		<u>5</u>	of <u>6</u>		

# RCRA LEVEL C QC

Name	A Lerch	11 Da	te <u>02/09</u>	91	
QC Check:	Other	/ <u>ас                                    </u>			
COMMENTS:	nous				
••					
ACTION: _	none_				
sample #	constituent	<u>value/qual</u>	sample_#	<u>constituent</u>	<u>value/qual</u>
			3 3 1 1 1 2	•	
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6 of C

#### INTRODUCTION

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This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-I Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the PNL Technical Project Plan (TPP) 17662 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-I Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples was Total Organic Carbon. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates and methods blanks were analyzed. All QC data that exist are include in this Data Package/Report.

The data in this package are reported in separate tables for soil samples (Table 2) and water samples (Table 3). The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms and one that contains the primary total organic carbon analytical data.

#### **CERTIFICATION STATEMENT**

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPjP ALO-001, for completeness. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

Bal M Gillespie 200-BP-1 Project Manager

<u>//- みん-90</u> Date

#### Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

PNL ACL Quality Representative

11/26/90 Nate

TABLE 1: 200-BP-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number	<u>Sample Type</u>
699-49-57B-216	90-5337	Soil
699-49-57B-216A	90-5338	Soil
699-49-57B-216B	90-5339	Water
699-49-57B-216C	90-5340	Water
699-49-578-220	90-5341	Soil
699-49-57B-216D	90-5342	Water
699-49-57B-229	90-5348	Soil
699-49-57B-299A	90-5349	Water
699-50-53B-208	90-5354	Soil
699-50-53B-208A	90-5355	Soil
699-50-538-214	90-6702	Soil
699-50-538-225	90-6703	Soil

#### TOTAL ORGANIC CARBON ANALYSIS RESULTS

The soil samples and their accompanying QC samples were prepared by procedure PNL-7-40.37, Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer. The methodology is consistent with SW 846 Method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure and calculations. The water samples and their accompanying QC samples were prepared by procedure PNL-7-40.7, Solutions Analysis: Carbon. Analysis for both soil and water samples was performed in building 325 in the 300 area.

#### Soil Samples

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With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major source of carbon in the blank is adsorbed  ${\rm CO_2}$  on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to determine the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit. For purposes of this report, the daily blank value is used as the lower quantification limit for the analyses. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported in this data package. This "method detection limit," defined as three times the standard deviation of the blank values, is ~5  $\mu$ g of total organic carbon in the analytical sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPjP ALO-001) ranged from less than 2% to 89%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received and their moisture content. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. The analyst followed the accepted protocol of mixing the sample but heterogeneity still remained as demonstrated by the duplicate results. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard results (of the same Kodak  $\alpha$ -D Glucose standard) for this set of data, the recoveries ranged from 88% to 102%. The average recovery was 97.5% with a standard deviation of 4%. The conclusion is that the precision from this set of data is  $\pm$  4% relative, and a bias (accuracy) of -3% on the average.

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The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for all but three of the soil sample analyses in this data report. The three analyses that failed to meet hold times were performed two days late due to the required 100% real time surveillance backlog by the QA engineers. The "late" analyses of the samples has no impact on the results.

#### Water Samples

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With the Dohrman DC80 total organic carbon, a check standard is injected into the instrument repetitively until two successive results are within 1% relative. This standard value is taken as the one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. An average "method detection limit" for this analytical method is estimated from past analyses at 0.7 mg/ml.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations ranged from less than 1% to 25%. This variability of difference is mostly attributed to the small amounts of total organic carbon in the water samples. The sample results are near detection limits.

At least one standard is analyzed daily (in at least duplicate) as a one point calibration of the instrument. Upon review of the standard results for this set of data, the recoveries ranged from 95% to 105%. The average recovery for the 10 ppm standard was 100% with a standard deviation of 5%. The conclusion is that the precision from this set of data is ± 5% relative, and a bias (accuracy) of 0 on the average. The spike recoveries, however, were not as good. The average recovery was 71% with a standard deviation of 19%. The poor recoveries are attributed to spiking at 2 times the detection limit (detection limit of about 0.7 to 0.8 ppm). The standard deviation of the spike recoveries that are so near the detection limit is expected to be larger than if samples were spiked at five to ten times the detection limit. The spike sample and spike blank analysis was not requested in the TPP or the client SOW for TOC analysis.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was not met for the water sample analyses in this data report. Upon analysis of the samples within the hold time, the results were found to be extremely poor. The instrument was in need of repair. Samples were reanalyzed as soon as the instrument was repaired. The "late" analysis of the samples has no significant impact on the results as the water samples were properly acidified in the field prior to delivery.

Table 2: 200-BP-1 Total Organic Carbon Analysis Data Soil Samples

WHC Sample #	PNL Sample #	Sample Type	Sample Wt, g	ug C Result	ug C in Sample	mg C/Kg	% Std Dev of Dups	Date Sampled	Analyzed
699-49-578-216 " " " "	90-5337-1 90-5337-2 90-5337-4	Sample Duplicate Blank	6.10728 6.11847	15.42 13.74	10.3 8.62	96.0 J 72.8 5.12	19.48	10-01-90 10-01-90	10-16-90 10-16-90 10-16-90
699-49-57B-216-A	90-5338-1 90-5338-2 90-5338-4	Sample Duplicate Blank	0.15658 0.18086	13.3 14.33	8.18 9.21	52.2 3 50.9 5.12	1.81	10-01-90 10-01-90	10-16-90 10-16-90 10-16-90
699-49-57B-220 41 11 41 16	90-5341-1 90-5341-2 90-5341-4	Sample Duplicate Blank	0.20066 0.177	11.98 10.72	7.82 6.56	39.0 フ 37.1 4.16	3.55	10-02-90 10-02-90	10-17-90 10-17-90 10-17-90
699-49-578-229 H H H H	90-5348-1 90-5348-2 90-5348-4	Sample Duplicate Blank	0.25607 0.2927	17.61 29.96	12.79 25.14	50.0 <b>5</b> 85.9 4.82	37.42	10-08-90 10-08-90	10-18-90 10-18-90 10-18-90
699-50-53B-20B 	90-5354-1 90-5354-2 90-5354-4	Sample Duplicate Blank	0.12673 0.1192	7.68 6.04	2.86 1.22	22.6 T 10.2 4.82	53.21	10-10-90 10-10-90	10-18-90 10-18-90 10-18-90
699-50-53B-208A п и н н	90-5355-1 90-5355-2 90-5355-4	Sample Duplicate Blank	0.13256 0.16214	8.33 9.57	3.51 4.75	26.5 29.3 4.82	7.15	10-10-90 10-10-90	10-18-90 10-18-90 10-18-90
699-50-53B-214 	90-6702-1 90-6702-2 90-6702-4	Sample Duplicate Blank	0.30895 0.31202	9.17 9.84	4.35 5.02	14.1 16.1 4.82	9.42 ,	10-11-90 10-11-90	10-18-90 10-18-90 10-18-90
699-50-538-225 ""	90-6703-1 90-6703-2 90-6703-4	Sample Duplicate Blank	0.21405 0.22741	16.94 61.2	12.12 56.38	56.6 * 248 4.82	R 88.84	10-12-90 10-12-90	10-18-90 10-18-90 10-18-90

<sup>\*</sup> Sample was very wet.

Detection Limits for the three blank results above (3 times std. dev.) is 1.5ppm.

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040, 325 Bldg., rm 313. Data reported from LRB 52996, pp 48-51.

Relative Standard Deviation of the nine standards analyzed is 1,95%.

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Table 3: 200-BP-1 Total Organic Carbon Analysis Data
Water Samples

WHC Sample #	PNL Sample #	Sample Type	ug/mL Sample	Ave. ug/mL Sample	RSD of Dups (%)	Spike %Rec	C4 Cntrl XRec	Lab Cntri %Rec	Date Sampled	Analyzed
		10ppm Lab Cntrl	10.1 10.5	10.3				103		
699-49-578-216B	90-5339-1	Sample	0.67	0.63	9.0				10-01-90	10-24-90
	90-5339-2	Duplicate	0.59	0.44	0.7					
	90-5339	Triplicate	0.65 0.57	8,61	9.3					
	90-5339-3	Ouadruplicate Sample+Spike	1.46	1.38	8.2	50				
	n 20-2224-2	Saubreashire	1.3	1.,0	0.2	00				
	90-5339-4	Blank+Spike	1.16	1.19	3.6		77			
	10 0007 4	DIGIN. OPING	1.22		2.5		• • •			
	90-5339-5	Blank	0.05	0.03						
	ı,		0.004	·						
	90-5339-6	Dupl+Spike	1.57	1.46	11	56				
	11	•	1.35							
										40 7/ 00
699-49-57B-216C	90-5340-1	Sample	0.40 5	0.34	25				10-01-90	10-24-90
	90-5340-2	Duplicate	0.28	4 70	11	64				
	90-5340-3	Sample+Spike	1.40 1.20	1.30	11	54				
	••		1.20							
699-49-57B-216D	90-5342-1	Sample	0.16	0.17	4.3				10-02-90	10-24-90
0,, 4, 5,5 6,55	90-5342-2	Duplicate	0.17		,,,					
	90-5342-3	Sample Spike	1,40	1.35	5.2	79				
	**	• •	1.30							
		10ppm Lab Cntrl	9.3	9.4				94		
			9.1							
			9.9							
		10 lab c-4-l	10.0	9.8				98		
		10ppm Lab Cntrl	9.4	7.0				70		
			10.1							
			10.1							
699-49-578-229A	90-5349-1	Sample	1.34 丁	1.33	1.1				10-08-90	10-25-90
	90-5349-2	Duplicate	1.32							
	90-5349-3	Sample+Spike	2.94	2.88	2.9	103				
	tt.	- •	2.82		,					
								,		
		10ppm Lab Cotrl	10.6	10.5				105	•	
			10.4							

Total Organic Carbon by PNL Procedure 7-40.7, on Instrument WA64102, 325 Bldg., rm 400. Data reported from LRB 53093, pp 55.

Samples and Controls spiked at 1.5 ppm. The 1.5 ppm spike level is about 2xDL and therefore spikes exhibit somewhat poor recovery

1 2/09/91

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# **B1 - WESTINGHOUSE CHAIN OF CUSTODY,**

# SAMPLE ANALYSIS REQUEST FORMS

AND PNL SAMPLE RECEIPT FORMS

## SAMPLE RECEIPT FORM

Deli	vered by:_	Steffler	Date/Time: 10/2/90 1600
Rece	ived by:	MW LARIE	
Cust	omer Sampl	e Number(s): 216 21	6-A, 216-B, 216-C
ALO	Sample Numi	ber(s): <u>90-5337</u> 9	0-5338 90-5339 -90-5340
1.			PresentAbsent
2.		l Shipping Forms (list): mPLE カルAし4515 尺c	
3.	Custody S	eals on Shipping and/or	Sample Containers and their Conditions.
		Absent	
	If Presen	t, Condition: <u>70-5337</u>	seaded only against CAP-NOT Bottle
4.	Sample Ta or on Sam	g(s) ID Numbers if not I ple Vial.	Seaded only against Cap-NOT bottle OKAY Recorded on the Chain-of-Custody Record
·.	Notes:	NA	
5.	samoles a	re at refrigerated tempor	(Verify that ice still exists such that erature).
6.	Condition	TIFY SHIPPING CO. OF Sample Vials.	DE BY STEFFEER COULD NOT INTANER. & FELT COLD
7.	Documents		agreement of Information on Receiving
8.		on of Problems or Discre	pancies.
	Ν/,	A	

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RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford Company		CHAIN	N OF CUSTODY
Company Contact. U) 5 To	lom por	Tale	pnone <u>373-38/8</u>
nole Collected by 8 3 5	eller wstre	16 16 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	1) Time (1,00)
Sample Locations 69-49	-577		701-102
		Field Logbook and	Page No. LCHC-N-=77- )_AAI,22
Remarks Camelia Visa	n 1299-49 57C	to be car	aid ag ASL von the
analysis to 200		•	`
Bill of Lading No. UNA		Offsite Property No	o. NA
Method of Shipment Una	1 car - 1.4		
Shipped to ihand Car	114 to 43 4 F	NL LAC. UN	C 436 C48.
Possible Sample Hazards <u>Your</u>	indicated	her field	in the near
		VL	•
	C:mal:le	fentification	
1699-49-578-216	▼	;	
1 257 - 0 6 - 100	stan com	100000 50	USCUL NOTICE TO
1 - JC M. C IEM CO	-30.20-31-11-11-11-11-11-11-11-11-11-11-11-11-		usur Methodasson TOC.
2) 699-49-578-216-A			
		1 54.584	16 Mitial 20100, T.C.
1. 3 699-49-578-216	7 - P	<u> </u>	
, , ,		hed 9060 T	CC. With Dat LICE
4) 699-49-573-216-	•		
1 125 nd clartic	bottle Metrol	9060 TOC.	water, 2ml HCL
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Relinquished by:	Received by		/0/1/90 Date/Time:
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1quished by:	Received by:	· `~	Date/Time:
		•	
Relinquished by:	Received by:		Date/Time:
•	,,		

(2	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST	
		PART I: FIELD S	ECTION	
	. ) Then upon 1 RZ		Date Sampled <u>[0]</u> 190 Time (4) Telephone (509) 373-3815	) hour /050
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	
699-49-578	-216 120 mlantes	Klass a acule	Usuil, 5w sub Meth-19060	-0C
699-49-5	15-216-A, 1250 me c	Inder slaw	aquile soil Sw846 Mitter	C60,T
699-49-578	3-216 B 1.125 mg ola	enc bectle	Method 9060 Toc 2nd HC-	prever
699.49.571	-2110C 1125ml clast	Li boetle Me	that 9000 TOC 2 mily Char	<u>ierval</u>
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		<u> </u>		
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			منالت، ا	
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			1011190	
Field Informat	ion** <u>samples h</u>	and car	isol to X 325 PNL Lab.	
Special Handli	ng and/or Storage <u>kee</u>	p coal o	- (.v+ 100)	
<del></del>		PART II: LABORATO	RY SECTION	
Received by _	W///0) 7/12	Title	TOUS XCADU Date 10/	7/00

A-6000-406 (07/89)

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

## SAMPLE RECEIPT FORM

Deliv	vered by: Stafflev Date/Time: 10/2 1600
Rece	ived by: M. W. URIE
Custo	omer Sample Number(s): 699-49-57B-220, 699-49-57B-216D
ALO S	Sample Number(s): 90-5341 90-5342
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list):  REQ. FOR SAMPLE ANNICYSIS
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: GccD
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
<sup>78</sup> .	Notes: NA
, <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  PHCKED INTO 325 BLD6 BY STEFFICE COULD NOT UERIFY SHIPPING CONTAINER. SAMPLES FELT CULD Condition of Sample Vials.
6.	
_	GOOD
7.	Documents. ,
	ABRET NWC
8.	Resolution of Problems or Discrepancies.
	n) A

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford Company	CHAIN	F CUSTODY		
Company Contact. W.S. Thompson Telephone 373-3818  . aple Collected by LU. S. Thompson R2. Hettle 5/2/30. Time D830, 0750.  Sample Locations 1699-49-578; 600 PREA; just North of By Cribs  Ice Chest No. 1- SLEERY POLYCOLER Field Logbook and Page No. LUHC-N-287-2 pg-  Remarks Samples to the Cellocted and Drupped to 325 PNL (AB  Analysis of SW846, 9060, Total organic Carbon  Bill of Lading No. NA Offsite Property No. NA  Method of Shipment Navad Carry UK ASL SAMPLE Van  Shipped to 325 PNL LAB  Possible Sample Hazards None Underated with field instruments				
1)1-99-110-678-220	Sample Identification			
1)699-49-57B-220 1,250 Ml, amberglas	s, soil, Methodana T	oc. analysis		
2)699-49-57B-216D, 1	, 125ml plastic, 2ml H	21, unter, Alethar 3060 Te		
	Chain of Possession			
Relinquished by: W.S Mompion	Received by: R.2 Steriter	Date/Time: 192190 101048		
Relinquistred by:  Relinquistred by:	Received by:	Date/Time: 10/2/90 1600 1/KS		
Relinquished by:	Received by:	Date/Time:		

V V	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST				
)		PART I: FIELD SE	CTION			
	E. Steffler /WS THO.		Date Sampled <u>10/3/3</u> Time <u>083の</u> hours Telephone ( <u>509</u> ) <u>373-38/8</u>			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested			
) 69G1-49-57	5-220 1,250 ml, a	mber glass, s	ail: 5W846 Method 9060 T.O.C.			
) 699-49-57	3-216D, 1,125ml pla	ME, I'M HCC	ail; SWE46 Method 9060 T. O. C., wester, Altod Method 9060 TOC.			
		•				
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	,					
for a	Malysis by Tota	l organic	<u></u>			
	ing and/or Storage <u>CRS E</u> LLC To 325 PN C		on wetice - Mank			
		PART II: LABORATO	DRY SECTION			
Paceived by _	MW Whi	Title 6	voup reader Date 10/2/90			
alysis Requ	ired					

A-6000-406 (07/89)

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

PNL-ALO-051, Rev. 0 Exhibit 1 Page 1 of 1

	SAMPLE RECEIPT FURT
Deli	vered by: 5/0//lev Date/Time: 10/9/90 8:05
Rece	ived by:
Cust	omer Sample Number(s): 699-49-578-229 69-49-578-299
ALO	Sample Number(s): 90-5348 90-5349
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Request for ANalysis
3.	
	Present Absent
	If Present, Condition: 600 D
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
~.	Notes:
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  SAMPLE IT AND DELIVERED TO 325 BLDG - ICE NOTO
6.	UERIFIED - SAMPLES COLD Condition of Sample Vials.
	GOD
7.	Verification of Agreement or Nonagreement of Information on Receiving
	Agree nu
8.	Resolution of Problems or Discrepancies.

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RETURN COMPLETED FORM TO PROJECT MANAGER

	Westinghouse Hanford Company		CHAIN.OF CUSTODY
	Company Contact W.S. Thomas	oson	Telephone <u>373-3818</u>
	Sample Collected by (1) S. Th. Eyn. C	CON. K.Z. Stuffer	E 8/10/90 Time 1345: 1350.
	Sample Locations 699-49-578	- 11	
			d Lagbook and Page No. LOHC-N - 287-2 عو 34-3
1			en 200-13P-1 Total Erganic
-	Caren andre		
	Bill of Lading No		ite Property No. 📈 A
ļ	Method of Shipment hand ca	•	Semple van to 305 PNL
	Shipped to 325 PNL Law	. ()	
[	Possible Sample Hazards <u>Move in</u>	dicated un	the heeld instruments
ł		_	0.
}		C	
Ì	1) 699-49-578-229 90	Sample Identifi 5 3 4 2	cadon
Ì	1, 120ml. amberglass.		14 107/ A
1	- 1, 100 miles general,	sice in the just	**C82 9 C60
·	2)699-49-57B-229 A 9		
			9060; Ime Hosay added
	- 1,220 mg, constactly costs, costact	c, roc, recon	4060; I'me Hosey araca
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}-	<del>/</del>	Chair at Carr	
}		Chain of Posse Received by:	
}	Relinquished by: W.S. Thompson	Received by:	\ \
F	7. I. Nicompson Relinguished by:	Received by: \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	10/8/90 /435 Date/Time:
	A 2 Start	7/1/1/1/1///	10/8/90 1435 Date/Time: 10/9/90 8:05
-	inquished by:	Received by:	Date/Time:
	miquisnes by:	veceisen på:	- Date/lime:
-	Relinquished by:	Received by:	Date/Time:
	nemquared by.	PO? —	

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, (Y	Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST				
		PART I: FIELD SE	CTION			
	.s. Thompson: R		Date Sampled <u>/0/8/90</u> Time <u>/345</u> hours Telephone ( <u>509) 373-36/8/350</u>			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested			
699-49-57B	-229 : 1,120ml, and	verglass soil	; Toc: Method 9060			
699-09-57	-229 A. 1.250ns, an	her gras ; u	iter; TOC Method 9060; I me H-SOM			
····						
		MA				
<del></del>						
$\overline{}$		1				
$\overline{}$						
- Metho	ition** <u>Samples to 1</u> -d 9060; Iing and/or Storage <u>har</u>		0 10/8/90 ws7			
	M11111.	PARTII: LABORATO	1 / / / / / / / / / / / / / / / / / / /			
Peceived by	-111 W M	Title <u>(2/</u>	10UN ALXAIN Date 10/9/90			

A-6000-406 (07/89)

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

## SAMPLE RECEIPT FORM

Nol i	vered by: Steffer Date/Time: 10/10/40 13:05
Deri	7
	rived by:
Cust	omer Sample Number(s): 699-50-53B-208, 208A
ALO	Sample Number(s): 90 -5354, 5355
7	Customer Chain-of-Custody Form: PresentAbsent
1.	Customer Chain-of-Custody Form. Fresent Absent
2.	Additional Shipping Forms (list):
	Request for Analysis
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: 6008
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
*.	Notes: Notes:
, <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
	Iced
6.	Condition of Sample Vials.
	Good
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
	Agree mar
8.	Resolution of Problems or Discrepancies.
	NA

0

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford Company	C	HAIN OF CUSTODY						
Company Contact WENDY S T	nem psen	Telephone (509) 373 - 3818						
Sample Collected by LU.S. Thony	SCIVEZ Steffa Date 10/1	0/90 Time 0900:0990 ·						
Sample Locations 699-50-53B, wellsite in was Area Noeth of 200 ERT								
Ice Chest No. Field Logbook and Page No. WKC-N-387-2-pg39-4/								
Remarks An intelea Collected for a raliper of 200-BP-1 RI/FS - Sametin to be								
anolimed will Total Citte	ANIC CARISEN (COS STORE) ME	ent quark & workplan DEKE 88-3)						
Bill of Lading No. NA								
	Method of Shipment Nand Corry to 3.25 PNL LAB /300 AREA on ASL Samuel Van							
Shipped to 305 PNL ht 30054		•						
Possible Sample Hazards Trone Cr		M. OTALL TO L						
Possible Jampie Hazards 700-007	terre to the second of	·						
-	Sample Identification							
699-50-538-208								
1,120 ml. Amber ovass Aprison so	12 Su 546 Me Med 9000 Analy	15is for Tithe Calemaic CHRISTIN (T.C.C)						
699-50-53B-208A	,							
. 1	OU SWEELS MY HOOD GOWO. An	ULYSIS FOR TITIAL DESAMIC CARRONITOL						
The minimum states in the state of the state	<u> </u>	· · · · · · · · · · · · · · · · · · ·						
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		1						
	<del>\</del>							
	· /							
<u> </u>	Chain of Possession							
Relinquished by: Wendy S. Thony	Received by: R2 Sterle	.   50.0.1						
St. S. Trompson	1 N.S Blefile	10/10/90 1000 Aus.						
Relinquished by:	Received by:	Date/Timey						
-K3 H1/L	111111111111	10/10/90 1305 HRS						
nquished,by:	Received by:	Oate/fime:						
Relinquished by:	Received by:	Date/Time:						
•								

A-6000-407 (04:90)

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Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST		
)	•	PART I: FIELD SI	ection :	
	). S. Thompson / R. tact h). S. Thompson	Z. Steffler 200-BP-1	Date Sampled <u>/0//0/90</u> Time <u>09.00</u> hour Telephone (509) 373-38/8	
Sample Number	Number and Type of Sample Containers	Type of Sample* Analysis Requested		
699-50-53	18-208, 120ml, amber.	AQUIFER SOIL A	naturals for Total Organic Carbon	
699-50-536	-2084, 120 m. amber.	namer soit.	analysis for Torm Organic Carbon	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	V 0 7	Method 9	
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		/		
<i></i>		NA		
	· · · · · · · · · · · · · · · · · · ·			
		<del></del>		
<del></del>		<del></del>		
	<u> </u>			
Field Informa	tion** Shruples Lo. Theng 200-19-1	be analymod RI/FS	dor, Total Organic Carton (1	
	ing and/or Storage <u>Accura</u>	carry te.	325 HNL LAB /300 HEEA; by ASI	
		PARTII: LABORATO	DRY SECTION	
Poreived by	11720 Mu	Title	nour Leallo Date 10/10/90	

A-6000-406 (07/89)

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

## SAMPLE RECEIPT FORM

Delivered by: R. STCFFLER Date/Time: 10/11/90 - 13coHvs
Received by: Mike unie
Customer Sample Number(s): 699-50-538-214
ALO Sample Number(s): 90-6702
1. Customer Chain-of-Custody Form: Present Absent
2. Additional Shipping Forms (list): RAS AND REQUEST FOR MANAGES
3. Custody Seals on Shipping and/or Sample Containers and their Condition
Present Absent
If Present, Condition: Coul
<ol> <li>Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Recorded on Sample Vial.</li> </ol>
Notes: $N/A$
5. Condition of Shipping Container (Verify that ice still exists such the samples are at refrigerated temperature). Good
6. Condition of Sample Vials. Carab
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.  AGRee
8. Resolution of Problems or Discrepancies.
N/A

(T)

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanf Company	ord	CHAIN OF CUSTODY			
Company Contact W.S. T	Trompson	Telephone (509)373-3818			
		Date 10/11/90 Time 1100 .			
		vellsite, North of 200EAST			
• • • • • • • • • • • • • • • • • • • •	·	Field Logbook and Page No. WHC-N - 287-2- PG 49			
Remarks hand con	y sample to 3251	ONL for analysis of Total Organic			
Carbon - san	f } *				
Bill of Lading No	<i></i>	Offsite Property No. NA			
Method of Shipment	ed corrying (0)	chestin ASL Vanto 325 PNC LAD (3			
Shipped to ろろ	U				
	one indicated u	with field instruments			
		Ü.			
1) 699-50-538-214,	•	lentification _ SW846- Mechal- gold, soil; total organic carbon.			
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	<del></del>				
<del>/</del>					
<del>-/</del>					
•••	. Chain of	Possession .			
Relinquished by: W.S. Th	ompom Received by:	1º2 Staffer Date/Time:			
Hendy Shomes	R7 Ste	10-11-90 11:50			
Relinquished by:	Receive hby:	Date/Time:			
1.3 Sty/	\ //////////////////////////////////	har 10/11/90 12:55			
inquished by:	Received by:	Date/Time:			
Relinquished by:	Received by:	Date/Time:			
•	ROS =	3:-			

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Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST		
		PART I: FIELD SE	ection :	
Collector <u>W</u>	S. Thompson/R.Z. Ste.	Hler 200-13 P-	Date Sampled <u>/0 /11 /90</u> Time <u>//60</u> hours Telephone (609_) 3.73 - 3818	
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	
699-50-538	-214; /, 120ml, ambergla	s; soil; Total or	game earbon, Method 9060 (SW846)	
	· · ·			
	· · · · · · · · · · · · · · · · · · ·	W		
	·			
اس ا	tion** <u>Sample Co</u>	lected for	Malipis of Jotal organi	
Hlone	hayands ind	} - 0	- kield instruments	
Special Handl	ing and/or Storage <u>Rec</u> NL Lab—— Sam	e chille	livery.	
		PART II: LABORATO	DRY SECTION	
Pareived by	- 1001111	Title	nous deader Date 10/11/90	
alysis Requ.	ired			

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<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

## SAMPLE RECEIPT FORM

Dol:	vered by: Steffler Date/Time: 10/15/40 14:25
Dell	vered by: Date/Time: 10/15/40 142:05
	ived by: // (1/91)
Cust	omer Sample Number(s): 49-50-538-225, 699-55-55-075-073-074A
ALO	Sample Number(s): 40-6703, 90-6704, 90-6705, 90-6706
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): $R \leq R$
3.	Residual for Antilysis Custody Seals on Shipping and/or Sample Containers and their Conditions.
	Present Absent
	If Present, Condition: (CODI)
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
٠.	Notes:
, <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
_	LED
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving
	Documents ADGVEN MULL
8.	Resolution of Problems or Discrepancies.
	W/A

RETURN COMPLETED FORM TO PROJECT MANAGER

•	Westinghouse Hanford Company	CHAIN OF CUSTODY								
	Company Contact. W. S. Thompson Telephone (509)373-3818									
)	Sample Collected by W.S. Thompson /RZ. Sleffly Date 10/12/90 Time 1335 .									
	Sample Locations, 1,99-50-538	wellsite	•••							
i	Sample Locations, 1,99-50-538 wellow Field Logbook and Page No. WHC-N-287-2p.52-63									
	Remarks Januale to be analysed for TOC (Total Deganic Concon)									
	yer 200-10-1 PT /=5.									
i	Bill of Lading No. NA Offsite Property No. NA									
	Method of Shipment hand can	4 40 325 PNL LAB (300)	ARZEA)							
	Shipped to <u>·325 DNL (AB·</u>									
	Possible Sample Hazards <u>In Drue Cin</u>	dicated with field in	etunents							
			·							
	<u></u> -	Sample Identification	-							
	) 699-50-53B-225	. 200-31-								
į	1, 120 ml amber of as	Lail, analypes by Total	(Legami-Carbon (TOC)							
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1	•	Chain of Possession .								
	Relinquished by: W. S. Thempson R.	eceived by: 1.2. Sheffler	Date/Time:							
ļ	Kindy Monason	R? BiffL	10/12/90 1350 hrs.							
	Relinquished by:	eceived by:	10/12/90 1360 fus.  Date/Time: / /0/(5/91) //:25							
	K. J. Still	1111011h	-//							
_	Relinquished by:	eceived by:	Date/Time:							
	)	·								
	Relinquished by: Re	eceived by: ውርያ — ን ፣ ኔኔ	Date/Time:							
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Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST			
	•	PART I: FIELD SEC	TION :		
ollector <u>(</u>	1.5. Thompson /R	z. Stepler	Date Sampled 10/12/90Time 1335 hours		
ompany Con	tact W.S. Thompso	en <u>20</u> 08	Telephone (609) 373 · 38 · 8		
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested SUSUL May Load 9060		
<del>99-50-53</del>	p-225, 1, 120 ml, an	ver gan, to	ut, analysis of Total Organic Cont		
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	/.	<u> </u>			
	tion** Sample 1 to 1 RI/FS.	be cenary	ged for Total organic Carlom (		
special Hand	ling and/or Storage Lerp	ohiled			
		PART II: LABORAŢO	RY SECTION /		
Pagainad by	MWIlle	Title A	oup Leady Date 10/5/90		

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<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

Attachment 10

Pacific Northwest Laboratory, 200-BP-1, Total Organic Carbon

Data Package 3

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		DKI	A PACKICE VERIFICATION			
DATE RECEIVED: 12/12	90	,	SCI: Report 3, Rev. O, TOC			
LACONOTORY: PNL 33.	5 La	6	MODET: 200-8P-1			
LIBORITORY CONTACT: B.A	ORY CONTACT: B.M. Gillespie MOJECT COOPDINGTOR: J.A. Levech					
	PRESENT	ABSENT	TRACEABLE REWORS			
Internal chain-of-custody	X		•			
Lab chain-of-custody	X					
Airbill		X	NA Samples Hand Capited to Lab			
Shipping Order	ļ	X	W/A Samples Hand Consept to Lab			
Signature and Tally		X	N/A Somples Hand Carried to Lab			
Hazardous Materials Shipping		X	NA			
Request for Analysis	X					
Case Narrative	X					
Data reporting forms	X					
Raw data	X					
Electronic media		X	· N/h			
   <u>                                     </u>			O.M. Duuran 2-15-91 Duta Hanagament Clark Date			
DATA PACKAGE ACCEPTE	D WITH R	visions:	Project Coordinator Date			
DOTA UNISEABLE/DOTA	REJECTED: DVOLRRED	Book	ect continuator 2/15/91			
~	an Tuled TVLL		m +1 konomono 2/15/91			

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## OSM RCRA LEVEL C DATA ASSESSMENT

DATE 12/31/90		55-55-160	<u> 52-57-157</u> 8
REVIEWED BY JA Lerch &	-all samples bagin w/cgq	55-55-160A	52-57-160 B
LABORATORY PNL-3250	φ <b>κ</b> έfìΧ΄	55-55-162.	55-55-166
CASE # <u>TPP 16772</u>		<u>5\$-57-160</u>	55-55-190
SDG # Report 3; Rev O		52-57-157A	52-57-162
TOC	ra acceecurum cuuun	52-57-160A	
<u>ua.</u>	<u>ra assessment summa</u>	<u>ukt</u>	
QUALITY CONTROL CHECK	ANALYSIS TOC	_ \	
1. Holding time	_0_	<u> </u>	
2. Matrix Spike	0		·
3. Duplicate Analysis	<u> </u>		
4. Blanks (see attach	)		
5. Calibration/Control	Std <u>0</u>	\	,
6. Other QC	See at	tach	
1.			\
8			
9.			<u> </u>
10.			
<pre>0 = data had no problems X = data qualified due t M = data qualified due t</pre>	o minor problems o major problems/s	-	
OVERALL ASSESSSMENT: NO		w-all resu	15
acceptable w/qu	alification	*****	<del></del>
NOTES: see other for PA	IL-WHC Same	ole 10 correl	otions
+ sample most			
o Refer to the corresponding		planation of any	problems.

14 /400044

Name JA Lerch Date 12/31/90.

QC Check: Holding time

COMMENTS: 28 day holding time met for

all samples

ACTION: none

sample # constituent value/qual | sample # constituent value/qual

\_\_\_\_\_ of \_\_\_\_\_6

RCRA LEVEL C OC	
Name <u>JA lerch</u> Date 12/31/90	<del></del>
QC Check: Matrix Spike	
comments: all MS recoveries for water wit	hin
acceptible limits	
-no MS run on soils	
· MS not required by TPP or SOW acc	cording to case Narrative
ACTION: none	
•	
•	
sample # constituent value/qual sample # constitue	nt value/qual

. 2 of 6

<b>RCRA</b>	LEV	EL	C	OC.

Name JA lerch 1 Date 12/31/90
QC Check: Duplicate Analysis
comments: <u>Duplicate RPD high on sample</u>
ACTION: qualify associated results as per OSM quidelines
sample # constituent value/qual   sample # constituent value/qual
-55-55-162 POC 21.5 J

RCRA LEVEL C QC Name JA Lerch Jo Date 12/31/90 QC Check: Blank Analysis COMMENTS: Daily blanks are used to set daily

sample quartitation limits (for more into

See CASE NARRATIVE: TOC Ananlys Results) evaluation of contamination cannot be made ACTION: none sample # constituent value/qual sample # constituent value/qual

4 of 6

# RCRA LEVEL C QC

Name JA lerch Date Of Check: Calibration (Control	e <u>12/30/90</u>		
QC Check: Col: bration/Control Sts			
comments: foc-all 5+d re	coverier ok		
41			
-			
ACTION: none			
sample # constituent value/qual	sample # constituent value/qual		

5 of 6

	RCRA_L	LYCL C QC		
Name <u>JA Lerch</u>	Date	12/20/90		
qc Check: Other E	ر			
COMMENTS: none				
ACTION: NON-				•
sample # constituent	value/qual	sample_#	constituent	<u>value/qua</u> l
•				
	,			
	, 			

6 of 6

200-BP-1 SUMMARY TABLE Laboratory: PNL-325 SDG #: Report 1, Rev 0 Report 2, Rev 0 Report 3, Rev 0

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# TOTAL ORGANIC CARBON - soil sample value/qualifier

Sample Number	value/qualifier
Report 1	(ug/g)
49-57B-157.5	73 J
49-57B-157.5D	95 J
49-57B-160	69 J
49-57B-161	113
50-53B-EB	94 J
50-53B-155.7	43 J
48-50-168-1	176
48-50-168-176	149
48-50-168-2	131
48-50-176.7	221
52-54-168.5	280
	•
Report 2	(mg/Kg)
49-57B <b>-</b> 216	96.0 J
49-57B-216-A	52.2 J
49-57B-220	39.0 J
49-57B-229	50.0 J
50-53B-208	22.6 J
50-53B-208A	26.5
50-53B-214	14.1
50-53B-225	56.6 R
00 002 120	5515 10
Report 3	(mg/Kg)
_55 <del>-</del> 55-160	92.3
55-55-160 <b>-</b> A	125
55-55-162	21.5 J
52-57-160	61.0
52-57-160-B	84.1
55-55 <b>-</b> 166	61.5
55-55-190	23.8
52-57-162.0	47.9

not reported and/or requested

all sample numbers begin with 699- prefix

#### 200-BP-1 SUMMARY TABLE Laboratory: PNL-325 SDG #: Report 1, Rev 0 Report 2, Rev 0 Report 3, Rev 0

# TOTAL ORGANIC CARBON - water sample value/qualifier

	Sample Number	value (ug/ml)/qualifier
	Report 1	
נען	no water samples	
******	Report 2	
ŧ	49-57B-216B	0.67 J
<b>O</b>	49-57B-216C 49-57B-216D	0.40 J 0.16 J
met,	49-57B-229A	1.34 J
	eport 3	
.pr.#.	52-57-157-A 52-57-157-B	0.41 0.99
P-part Table	55-55-160-A	0.65

NR not reported and/or requested all sample numbers begin with 699- prefix

#### INTRODUCTION

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This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the PNL Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples was Total Organic Carbon. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates and methods blanks were analyzed. All QC data that exist are include in this Data Package/Report.

The data in this package are reported in separate tables for soil samples (Table 2) and water samples (Table 3). The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms and one that contains the primary total organic carbon analytical data.

#### **CERTIFICATION STATEMENT**

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPjP ALO-001, for completeness. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

/2-10-90 Date

#### Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

Y. J. Daniel
PNL ACL Quality Representative

12/10/90

TABLE 1: 200-BP-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number	<u>Sample Type</u>
699-55-55-160	90-6716	Soil
699-55-55-160A	90-6717	Soil
699-55-55-162	90-6718	Soil
699-55-57-160	90-6719	Soil
699-52-57-157A	90-6720	Water
699-52-57-157B	90-6721	Water
699-52-57-160A	90-6722	Water
699-52-57-160B	90-6723	Soil
699-55-55-166	90-6724	Soil
699-55-55-190	90-6725	Soil
699-52-57-162	90-6726	Soil

## TOTAL ORGANIC CARBON ANALYSIS RESULTS

The soil samples and their accompanying QC samples were prepared by procedure PNL-7-40.37, Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer. The methodology is consistent with SW 846 Method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure and calculations. The water samples and their accompanying QC samples were prepared by procedure PNL-7-40.7, Solutions Analysis: Carbon. Analysis for both soil and water samples was performed in building 325 in the 300 area.

## Soil Samples

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With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major source of carbon in the blank is adsorbed CO<sub>2</sub> on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to

determine the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit for that day. For purposes of this report, the daily blank value is used as the lower quantification limit for the analysis. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

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An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported for this project. The blank data may be found in data reports titled Total Organic Carbon Data Package No. 1, Total Organic Carbon Data Package No. 2 and in this data package. This "method detection limit," defined as three times the standard deviation of the blank values, is  $\sim 3.4~\mu g$  of total organic carbon in the analytical sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPJP ALO-001) ranged from 2% to 24%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received and their moisture content. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. The analyst followed the accepted protocol of mixing the sample but heterogeneity still

remained as demonstrated by the duplicate results. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard results (of the same Kodak  $\alpha$ -D Glucose standard) for this set of data, the recoveries ranged from 99% to 102%. The average recovery was 100.0% with a standard deviation of 1.4%. The conclusion is that the precision from this set of data is  $\pm$  1% relative, and a bias of 0% on the average.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for all but one (90-6726) of the soil sample analyses in this data report. This one hold time was inadvertently missed as the analyst did not realize that this sample was sampled three days prior to the other sample (90-6725) it was analyzed with and took the sampling date (10-29-90) as the same for both samples. The late analysis has no known impact the final results of the data.

### Water Samples

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With the Dohrman DC80 total organic carbon, a check standard is injected into the instrument repetitively until two successive results are within 1% relative. This standard value is taken as the one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. An average "method detection limit" for this analytical method is estimated

from past analyses at 0.7  $\mu$ g/ml.

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Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations ranged from less than 1% to 20%. This variability of difference is mostly attributed to the small amounts of total organic carbon in the water samples. The sample results are near detection limits.

At least one standard is analyzed daily (in at least duplicate) as a one point calibration of the instrument. Upon review of the standard results for this set of data, the recoveries ranged from 77% to 123%. The average recovery for the 10ppm standard was 101% with a standard deviation of 5%. The conclusion is that the precision from this set of data is ± 5% relative, and a bias of +1% on the average. The spike recoveries, however, were not as good. The average recovery was 105% with a standard deviation of 25%. The poor recoveries are attributed to spiking at 2 times the detection limit (detection limit of about 0.7 to 0.8 ppm). The standard deviation of the spike recoveries that are so near the detection limit is expected to be larger than if samples were spiked at five to ten times the detection limit. The spike sample and spike blank analysis was not requested in the TPP or the client SOW for TOC analysis.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for the water sample analyses in this data report.

Table 2: 200-BP-1 Total Organic Carbon Analysis Data Soil Samples

WHC Sample #	PHL ALO #	Sample Type	Sample wt.g	ug C Results	ug C in Sample	mg/Kg Sample	RSD (%) Dups	% rec. spike	Date Sampled	Date Analyzed
699-55-55-160	90-6716-1	Sample	0.28326	28.84	26.13	92.3	8		10-23-90	10-26-90
H	90-6716-2	Duplicate	0.25249	28.81	26.1	103	_		10-23-90	10-26-90
M	90-6716-3			20.01				99.25	,0 22 70	10-26-90
*	90-6716-4	Blank		2.71				,,,,,		10-26-90
699-55-55-160-A	90-6717-1	Sample	0.28147	37.81	35.1	125	8		10-23-90	10-26-90
¥	90-6717-2	Duplicate	0.3173	37.97	35,26	111	•		10-23-90	10-26-90
16	90-6717-3	Standard			02	•••		99,25	10 12 70	10-26-90
и	90-6717-4	Blank		2.71				,,,,,,		10-26-90
699-55-55-162	90-6718-1	Sample	0.55697	14.71	12	21.5 🗗	24		10-23-90	10-26-90
H	90-6718-2	Duplicate	0.60811	21.29	18.58	30.6			10-23-90	10-26-90
D	90-6718-3	Standard						99.25		10-26-90
Ħ	90-6718-4	Blank		2.71				*****		10-26-90
699-52-57-160	90-6719-1	Sample	0.33163	22.93	20.22	61.0	3		10-23-90	10-26-90
ii .	90-6719-2	Duplicate	0.39409	25.6	22.89	58.1	_		10-23-90	10-26-90
N	90-6719-3	Standard						99.25		10-26-90
Ħ	90-6719-4	Blank		2.71						10-26-90
699-52-57-160-8	90-6723-1	Sample	0.3902	34.54	32.83	84.1	3		10-23-90	10-26-90
N	90-6723-2	Duplicate	0.2981	28.93	26.22	88.0			10-23-90	10-26-90
и	90-6723-3	Standard						99.12		10-26-90
4	90-6723-4	Blank		2.71						10-26-90
699-55-55-166	90-6724-1	Sample	0.36091	24.92	22.21	61.5	14		10-24-90	10-26-90
10	90-6724-2	Duplicate	0.40881	33.39	30.68	75.1			10-24-90	10-26-90
**	90-6724-3	Standard						99.12		10-26-90
61	90-6724-4	Blank		2.71						10-26-90
699-55-55-190	90-6725-1	Sample	0.4421	17.1	10.5	23.8	7		10-29-90	11-13-90
4	90-6725-2	Duplicate	0.4401	16.09	9.49	21.6	•		10-29-90	11-13-90
N	90-6725-3	Standard						101.7		11-13-90
N	90-6725-4	Blank		6.6						11-13-90
699-52-57-162.0	90-6726-1	Sample	0.31368	21.63	15.03	47.9	2		10-26-90	11-13-90
H	90-6726-2	Duplicate	0.27817	19.48	12.88	46.3	_		10-26-90	11-13-90
Ħ	90-6726-3	Standard						101.7		11-13-90
u	90-6726-4	Blank		6.6						11-13-90

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040, 325 Bldg., rm 313. Data reported from LRB 52996, pp 53-57.

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JI,2/31/90

Table 3: 200-BP-1 Total Organic Carbon Analysis Data Water Samples

WHC Sample #	PNL Sample #	Sample Type	ug/mL Sample	Ave. ug/mL Sample	RSD of Dups (%)	Spike XRec	C4 Entrl %Rec	Lab Cntrl %Rec	Date Sampled	Analyzed
		10ppm Lab Cntrl	10.0 9.4 10.1	9.8				98		
		Water Blank	0.08 0.13	0.11						
699-52-57-157-A	90-6720 <b>-1</b> 90-6720-2	Sample Duplicate	0.41 0.31	0.36	19.6				10-23-90	10-26-90
	90-6720-3	Sample+Spike	2.06 2.10	2.08	1.4	115				
699-52-57-157-B	90-6721-1 90-6721-2	Sample Duplicate	0.99 0.81	0.90	14.1				10-23-90	10-26-90
	90-6721-3	Sample+Spike	2.04 2.08	2.06	1.4	77				
699-52-57-160-A	90-6722-1 90-6722-2	Sample Duplicate	0.65 0.58	0.62	8.0				10-23-90	10-26-90
	90-6722-3	Sample+Spike	2.65 2.27	2.46	10.9	123				
	90-6722-5	Blank	0.06 0.17	0.12						
	90-6722 <b>-4</b>	Blank+Spike	1.89 1.85	1.87	1.5		117			
		10ppm Lab Cntrl	10.6 10.4	10.5	1.4			105		

Total Organic Carbon by PNL Procedure 7-40.7, on Instrument WA64102, 325 Bldg., rm 400. Data reported from LRB 53093, pp 55.

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Samples and Controls spiked at 1.5 ppm. The 1.5 ppm spike level is about 2xDL and therefore spikes exhibit somewhat poor recovery

# B1 - WESTINGHOUSE CHAIN OF CUSTODY, SAMPLE ANALYSIS REQUEST FORMS AND PNL SAMPLE RECEIPT FORMS

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# SAMPLE RECEIPT FORM

	in the last what
Deli	vered by: Date/Time: 10/24/90 10/24
Rece	ived by: MW Min
Cust	comer Sample Number(s): <u>See Back</u>
	Sample Number(s): See Back
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): $\mathcal{R} \leq \mathcal{R}$
3.	Request for Analysis Custody Seals on Shipping and/or Sample Containers and their Conditions
	Present Absent
	If Present, Condition: Goop
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
•	Notes: Notes:
5.	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
6.	Condition of Sample Vials.
	GOOP
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.
	Agree
8.	Resolution of Problems or Discrepancies.
	NA

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RETURN COMPLETED FORM TO PROJECT MANAGER

	Westinghouse Hanford Company	CHAIN OF	CUSTODY						
. 1	Company Contact Wendy S. Thom	MON (Fryir Field Services phon	e (509) 373-3818						
	Sample Collected by W.S. Thompson	R. 2. Steffler Date 10/23/90	Time 13/0:13/0:1445						
	Sample Locations 1090-55-55 well	lsite 600 area North of	200 EAST						
ļ	Ice Chest No. " Sleepy " notes Coole	Ice Chest No. " Sleepy " poly Cooler Field Logbook and Page No. WHC-N-287-27777							
	Remarks all sombles to be	analyzed for TOTAL	ORGANIC CAPRON(TOC).						
	Samples support 2	60-BPJI Remedeal In	vestigation (Teasibility						
	Bill of Lading No. 1/A	Offsite Property No. 🗘							
	Method of Shipment hand care	4 to 325 PNL LAB A	ranalysis						
	Shipped to 325 PNL LABORA								
		do indicated with	field instruments						
		Sample Identification	· ·						
1)	699-55-55-160								
•	1,120ml., amberglass; soil;	analysis of Total org	anic Carbon (TOC) (PNL 7-40.37)						
د	1699-55-55-160A								
-/		Qualific of The party	or analy (Tag)						
_	1,120ml, amberglass; soil;	where of 1811 become	PN17-40.37						
	699-55-55-162	<del></del>							
-1	1,120ml, amberglass; Soil;	On alinea & Total organ	418 + 0 A LL - (700) PAIL 7-670 27						
•	Statement States		(1/2) + 1/3 / 3 / 3 / 3 / 3 / 3 / 3 / 3 / 3 / 3						
		·							
	**	Chain of Possession							
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	Henry Shompson	K. 3 Stepl	10/23/90 1515hs						
	Relinquished by:	eceived by:	Date/Time: / 10/24/90 / 7.10						
	1 1. 2 Stiffs	/// W Our	10/24/90 /210						
	.elinquished by:	eceived by:	Date/Time:						
	linguished by:	eceived by:	Date/Time:						
	1								

, <u>(Y</u>	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST			
	•	PART I: FIELD SECTION				
	S. Thompson /R. uan Wendy S. Thom	z. Stefflu pson	Date Sampled <u>10/23/90</u> Time <u>13/0</u> hou Telephone (509 ) 373-38/8 13/945			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested			
697-55-55-	60:1,120ml., amber	Rlass. Soil. T	otal organic carbon (7.0.C) PN27-4			
			al organic carbon (T.O.C) ANL 7-40.			
99-55-55	-162:1,120ml. nmix	en class soil	TOTAL BEGANIC CARAPIN (T.O.C) PNL 7-40.			
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Samo	on (TOC) FAZ 10/234 ples delivered Illing and/or Storage 110	o support to 325 PNL hazardo (	tal for analysis.			
	-Multh	PARTII: LABORAT				
ূৰনeived by alysis Rec		Title	LUDUP CLARI Date 10/14/90			

<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.

·	Westinghouse Hanford CHAIN OF CUSTODY Company							
,	Company Contact. Wendy S. Ther.	PublicalTelepho	one <u>(509) 373 - 3818</u>					
	Sample Collected by W. SThompse	in /RZStaffler Date 10/23/90	Time 0935:0645:08457					
	Sample Locations 699-52-51 Well with North of accosts 0945, 0935							
	Ice Chest No Field Logbook and Page No. WHC-N-287-2 pg.							
1	Remarks all somples to	be assalyzed for tot						
-	(T.O.C.) ou proting 200-BP-1 Resilected Investigation / Teasibility Shoty							
	Bill of Lading No. NA	Offsite Property No.						
1	Method of Shipment hand cans		chilled on wet ice					
	Shipped to <u>325 PNL LAB (36</u> Possible Sample Hazards <u>VLOTLE UN</u>	<del></del>	There is the					
1	Possible Sample Hazards _9000 000	<u>acaao in ing ieu ma</u>	huments.					
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k	100 62 67 15	Sample Identification	, es					
4	699-52-57-160							
	1, 130 mi. 11 mus gears, sore;	analysis of Total ordinic	Carbon (PNL7-4037)					
	699-52-57-157A							
.		eter; total organic carbon	(pre 7-40.7) (1/2 ml HCL)					
'س است								
	A9-52-57-157B							
7	1,250ml; amuer glass; wat	er. 1/2 ml. HCL TOTAL ORGANIC	CAKRON (PNL 7-40.7)					
1) .	697-52-57-160A		• •					
,	1,250ml, ambergass; water;	/2ml. HCL' TOTAL DEGANIC	CARBON (PNL 7-40.7)					
习	699-52-57-1600							
	1,120ml, amber glass; soil	TOTAL ORGANIC CHERON.	(ANL7-40.37)					
-								
1								
1								
		Chain of Possession .						
ſ	Relinguished by: Nendy 5. Thompso	Received by: R.Z. Steffler	Date/Time:					
Į	Fondy Thomason	R. 2 Still	10/23/90 1515 hs.					
	Relinquished by:	Received by	Date/Time:					
Į	K. J. Steff	11110 Um	10/21/00 12:10					
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J	Proportion and house							
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Company Contact W.S. Thompson Telephone (509), 373-38/R Colling Considers  Sample Number and Type of Sample Type of Sample Analysis Requested  Ana	(V	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST
Telephone (SD) 1373-38/R Colling Consider Containers  Sample Number and Type of Sample Type of Sample Containers  Analysis Requested  Analysis Req	·	•	PART I: FIELD SE	CTION .
Number Containers  1996 of sall proper Containers  1996 of sall proper Containers  1996 of sall proper Control of Stal organic Carlon MIZ-40.  1699-52-57-157A: 1, 250ml., Americ Constitutioner. (Han. Hell): Total organic Carnon (FNL 7-40.  1699-52-57-157A: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carnon (FNL 7-40.7)  1699-52-57-160A: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carnon (FNL 7-40.7)  1699-52-57-160B: 1, 120ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon (FNL 7-40.37)  1699-52-57-160B: 1, 120ml.; Americ Class; Soll': Total organic Carlon (FNL 7-40.37)  1699-52-57-160B: 1, 120ml.; Americ Class; Soll': Total organic Carlon (FNL 7-40.37)  1699-52-57-160B: 1, 120ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Total organic Carlon  1699-52-57-160B: 1, 250ml.; Americ Class; Waterer (Han. Hell): Tot			effler	Date Sampled <u>/0/23/90</u> Time <u>0935</u> hour Telephone ( <u>509) 373 – 38/8 0845</u> , 0945; 09
Field Information. Durply to be analyzed for Total pranic carrow (PNL7-40.37)  Field Information. Durply to be analyzed for Total pranic carrow (PNL7-40.37)  Special Handling and/or storage. Lear sumple charles in the little on west field information.  Special Handling and/or storage. Lear sumples charles in the little on west field information.  PART II: LABORATORY SECTION,			Type of Sample*	Analysis Requested
Field Information - Durphy to be analyzed for Total organic Carlon,  Augusting til 300-API DT #3. See statement grunds)  Special Handling and/or Storage Leap samples andicated with field instrument  PART II: LABORATORY SECTION	699-52-5	1-160; 1,120 ml. an	berglass; soil	. Total organic carbon AVL7-40.
Field Information = Samples to be analized for Total organic Carbon,  Special Handling and/or Storage Glass camples childed on wet con with field instrument  PART II: LABORATORY SECTION,  PART II: LABORATORY SECTION,	699-52-57	1574:1,20ml., AMBER	LASS WATER (1/2	ml. HCL): TOTAL DEGANIC CARBON (FNL 7-
Field Information ** Samples to be analyzed for Total Broanic Carbon,  Mignorian the 300-BDI BT HS. (see statement growth)  Special Handling and/or Storage Leap samples Childs on wet with field instrument  PART II: LABORATORY SECTION	69-52-57-	1578: 1, 250ml; Amare G	ASSYLVATER: (1/2m	HCL); TOTAL ORGANIC CARBON CANLT-40.
Field Information ** Samples to be analyzed for Total arganic Carbon,  Augrorium the 200-PAI RI PB. See statement growth).  Special Handling and/or Storage Lean complex chilled on wet ice until Nelson at 325 PN- (at. No hazards indicated with field instrument parties of the control of the c	JAA-52-57-1	60A : 1,250ml .; AMBER GLA	S; WATER(1/2M).	MCL); TOTAL DELIANIC CHEFON (FNL 7-40,7)
Special Handling and/or Storage Leap complex Chilled on wet ice until Accept  at 325 PNL lab. No hazards indicated with field instrument  PART II: LABORATORY SECTION.	697-52-57-1	60B; 1,120ml, amber 61	AKS; SOIL! TOTAL	ORGANIC OHRBON (PNL7-40-37)
Special Handling and/or Storage Leap samples Chilled on wet ice until Accept  at 325 PNL lab. No hazards indicated with field instrument  PART II: LABORATORY SECTION,	, -		·	
Special Handling and/or Storage Leap complex Chilled on wet ice until Accept  at 325 PNL lab. No hazards indicated with field instrument  PART II: LABORATORY SECTION.			:	
Special Handling and/or Storage Leap samples Chilled on wet ice until Accept  at 325 PNL Cab. No hazards indicated with field instrument  PART II: LABORATORY SECTION				
Special Handling and/or Storage Leap samples Chilled on wet ice until Accept  at 325 PNL (ab. No hazards indicated with field instrument  PART II: LABORATORY SECTION,				
Special Handling and/or Storage Leap samples Chilled on wet ice until Accept  At 325 PNL Cab. No hazards indicated with field instrument  PART II: LABORATORY SECTION,				
at 35 PNL (ab. 10 hazards indicated with field instrument	Field Informa	<i>D</i>		for Total organic Carbon, 178. (see statement zwork)
	Special Hand	lling and/or Storage <u>keap</u> 5PNL (ab. 120)		i
inte our Ocacion Date 10/ 24/40	?aceived by	Mulh.	PART II: LABORAT	ORY SECTION Date 10/24/90
.alysis Required	.alysis Req	uired		

Westinghouse Hanford Company	CHAIN OF	CUSTODY					
impany contact Wondu S. Thon	nnson Telephor	19(509) 373-3818					
Sample Collected by W.S. Thompson	Sample Collected by W.S. Thompson R.Z. Staffu Date 10/23 10/24/90 Time 082.5						
Sample Locations 694-55-55 MPM SUTC." NOVER OF 200 EAST							
	ce Chest No "Sleepy polycroly" Field Logbook and Page No. WHC-N-287-2-pg.79						
Remarks all morbles on this Chin of Custody to be analyzed.							
Jan total organic	<b>- x</b> /	08					
Bill of Lading No. NA	Offsite Property No.	NA					
Method of Shipment _ Chand Ca	erry to 325 PNL LA	<u> පි</u>					
Shipped to 325 PNL LAB.	<u> </u>	<u> </u>					
Possible Sample Hazards Mone in	dicated with build u	nstrumento					
		•					
	Sample Identification	;					
699-55-55-166		~					
1,120 ml., arriver class. Soil.	rotal organic carbon	0 1 : (000 - 10 27)					
Theorem Sun Source	, 10 the organic	- unilipes (11127-40.37)					
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	Chain of Possession .						
Relinguished by: 45.5. Thompson	Received by: R.Z. Steffler	Date/Time:					
Torbus homoson	R3 Styl	10/24/90 0910					
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R. P. Stattle	Milliam	10/24/90 12:10					
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	-						
Relinquished by:	Received by:	Date/Time:					
		•					

<u>(v</u>	Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST		
PART I: FIELD SECTION					
Collector W. S. Thompson 18.2. Steffler Date Sampled 10/24/90 Time 0825 hours Company Contact Wendy S. Thompson Telephone (509) 373-3818 200-821					
Sample Number	Number and Type-of-Sample Containers	Type of Sample*	Analysis Requested		
699-65-55	-166, 1, 120ml, amk	eralass; soil	; TOTAL DEGANIC CARBON (PNL7-40		
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_Carl	HIX. This samples is life life study.  Study.  Study.	Dupports & on on as As india	ated by fild instruments		
<b></b>	-N.111	PART II: LABORATO	DRY SECTION		
<sup>9</sup> eceived by	11/1/1/1/1/	Title _	Nous Oldella Date 10/24/90		

Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

PNL-ALO-051, Rev. 0 Exhibit 1 Page 1 of 1

## SAMPLE RECEIPT FORM

D-14	vered by: Stepler Date/Time: 10/30/90 /1-10
Rece	rived by:
Cust	comer Sample Number(s):699-55-55-190 699-52-57-160
ALO	Sample Number(s): <u>90-6725</u> <u>90-6726</u>
1.	Customer Chain-of-Custody Form: Present Absent
2.	Additional Shipping Forms (list): Regulat for Analysis
3.	Custody Seals on Shipping and/or Sample Containers and their Conditions
	Present Absent
	If Present, Condition:
4.	Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
••	Notes: N/A
. <b>5.</b>	Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). GOOD-OKAY
6.	Condition of Sample Vials.
7.	Verification of Agreement or Nonagreement of Information on Receiving Documents.  Agreement
8.	Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford CHAIN OF CUSTODY						
Sample Locations 699-55-55 We	1R 2 Steffler Di Usite (LOO Area: 1/2 o	eld Logbook and Page No. WHC - N - 287 - Z				
Remarks All samples to be analyzed for Total Decanic Carron  Bill of Lading No. — N/A — Offsite Property No. — N/A —  Method of Shipment Hand carry by ASL Sample Van to 325 PNL Lab.  Shipped to 325 PNL Lab (300 Area)  Possible Sample Hazards None indicated with Field Instruments						
1)697-55-55-190 1,120 ml; amber glass; so	Sample Iden	CARBON (PNL7-40.37)				
	Chain of Po	ossession				
Relinquished by:  Relinquished by:  Relinquished by:	Received by:  Received by:  Received by:  Received by:	Date/Time:    10 - 29 - 90				
nquished by:	Received by	10/30/90 /0;12 Date/Time: 40/30/96 //:10				

A-6000-407 (04/90)

Westinghouse Hanford Company	. CHAIN O	CUSTODY					
Company Contact Wendy S. T.	hompson Telepho	ne (509) 373-38/8					
Sample Collected by S.E. KOS /R.Z. Stofflor Date 10/24/90 Time 1403 .							
Sample Locations 699-52-57 W							
ice Chest No. Alpha # 4	Field Logbook and Pag	eNo. 1NHC-N-287-2					
Remarks All samples to be	e Chest No. Alpha # 4 Field Logbook and Page No. 1UHC-N-287-2  emarks Oll samples to be analyzed for total organic Carbon.						
		•••					
	Offsite Property No						
Method of Shipment Hand carry	by ASL Sample van to	325 PNL LAB					
Shipped to 325 PWL LAB 038	po(Area) :	•					
Possible Sample Hazards None und	icated with Lield instru	nents					
		•					
	Completed and Constant						
11099-52-57-162.0FT	Sample Identification						
1,120ml, amberclass soil.	Totalorginic carlon (A	(27-40.37)					
196	Chain of Possession						
Relinquished by: STEVEN E. KOS	Received by: R. 2. Steffler	Date/Time:					
Store L. Kan	R2 Hill	10/26/90 1435					
Relinquished by:	Received by:	Date/Time:					
R3 Stul	Alex & Kan	10/25/90 /229					
Retinquished by:	Received by:	Date/Time:					
Y Sters Ekre	fo Still	10/30/90 10:12					
elinquished by:	Received by:	Date/Time?					
TX3 Still	WW The	18/31/90 11:10					
		A-6000-407 (04/90)					

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Westinghouse Hanford Company		SAMPLE ANALYSIS REQUEST	
	•	PART I: FIELD SEC	
Collector N)	Thompson /R.Z. Stof	Hol	Date Sampled 10/26/90 Time 1403 hou
Company Con	was Hendy S. Thomp	O(Q)A	Telephone ( 509 ) 373-38/8
continuity con			
Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
699-52-57	1620. 1.120ml-amb	eralass: Soil - To-	TAL ORGANIC CHRISON; (PNL7-40.37) AL ORGANIC CARBON; (PNL 7-40.37)
697-55-59	-190 :1.120 ml amber	dass soil To	ORGANIC CARBON: (PNL 7 - 40.37)
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Eigle Inform	ation - All sample	a Talia amak	and In Take 1 24
rieid informa	les illimper	Do-	Della to the contract
1000	200-Bal	remedias	-Thusesugar - Thasinium Stud
	/	//	
i	ling and/or Storage <u>han</u>	Pearry Da	mplesto lat - Respon wet ca
uncer.	receipt at 3251	We LAB : D	is Majards indicated wiff
	field instrum		<u>U</u>
	V AMILIAN	PART II: LABORATO	HAT SECTIONS
?eceived by	7/11/11 /Wi	Title <i></i>	LOUP LOACH Date 10/30/90

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<sup>\*</sup>Indicate whether sample is soil, sludge, water, etc.
\*\*Use back of page for additional information relative to sample location.